# TO STUDY CLINICAL PROFILE AND OUTCOME OF BLUNT TRAUMA CHEST

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I hereby declare that the thesis entitled **"TO STUDY CLINICAL PROFILE AND OUTCOME OF BLUNT TRAUMA CHEST"** submitted towards partial fulfillment of the requirements for the award of **MS GENERAL SURGERY** degree to BFUHS is a compilation of original work carried out by me under the supervision of **Dr. Varun Gupta,** Associate Professor, Department of General Surgery, **Dr. P. S. Nain**, Professor, Department of General Surgery. No part of this thesis has formed the basis for the award of any degree previously.

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*Dedicated*

*to*

*my family*

*&*

*Teachers*

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***Dr. Harnarinder Singh***

# LIST OF ABBREVIATIONS

| | |
|---|---|
| AIS | thoracic Abbreviated Injury Scale |
| ED | emergency department |
| FFH | Fall From height |
| ICD | Intercostal tube drainage |
| ICU | intensive care unit |
| ISS | Injury Severity Score |
| MRI | magnetic resonance imaging |
| MVA | motor vehicle collision |
| NCRB | National Crime Records Bureau |
| NTDB | National Trauma Database |
| Road traffic accidents | RTA |
| RTS | Revised Trauma Score |
| SD | Standard deviation |

# ABSTRACT

**Aim:** Thoracic trauma is one of the most prevalent forms, accounting for 10% of admitted traumas to emergency services. We proposed a study to assess Clinical profile and outcome of blunt trauma chest.

**Material and methods**: This study was conducted in DMC & H Ludhiana. The study included 100 patients with blunt trauma chest trauma. Patients of age between 18 and 70 years were included in the study. The data regarding age, gender, mode of injury, presence of thoracic injuries, abdominal injuries, skeletal injuries was gathered and tabulated.

**Results:** The mean age of the patient was 41.52±7.7 years and majority of patients were male. Most common mode of injury was road side accident (RSA) and most common injury was rib fracture followed by pneumothorax 37% followed by lung laceration (21%), lung contusions(19%), hemothorax(12%), injury to tracheobronchial tree (4%) and flail chest and tensional pneumothorax seen in 3% each. 57% patients were managed by intercostal tube drainage while 43% were managed conservatively. The total revised trauma score decreased with increase in severity. There was significant difference in hospital stay (days) and no. of fractured ribs.

**Conclusion**: Preventive measures aimed at educating the common masses about the traffic rules and regulations and strictly implementing them is indispensable to reduce the incidence of chest injuries. Thus, mortality can be decreased significantly, if patient reaches at tertiary center earliest and appropriate treatment started.

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# KEY TO MASTER CHART

| | |
|---|---|
| **sex** | Male=M female= F |
| **MECHANISM OF INJURY** | RSA= road side accident<br>FFH=fall from height |
| **Rib fracture** | 1-3=1<br>4-6=2<br>>6 |
| **Severity and presentation of injury** | 1= present<br>0=absent |
| **Associated injury** | 1= present<br>0=absent |
| **Sign and symptoms** | 1= present<br>0=absent |
| **Mortality** | 1= present |
| **management** | 1= present<br>0=absent |

# INTRODUCTION

Accidental trauma is a major cause of morbidity and one of the top causes of death. [1] Injuries are the primary cause of death and disability for those aged 1-44. Few injuries result in greater and longer-lasting disability than spinal cord trauma. [2] Owing to its urgent life-threatening nature, identifying thoracic injuries in a patient with multiple traumas is considered a top priority. [1] Mortality rates reported to be connected with chest wall damage range from 4 to 20%.[3,4] Age, pre-existing pulmonary disease, an increased frequency of rib fractures, and flail chest are factors associated with an increased risk of morbidity and fatality. [1] In different parts of the world, the causes and patterns of injuries vary due to differences in infrastructure, civil strife, war, crime rate, and the enforcement of traffic laws.[5]

Increasing unplanned urbanization and the introduction of high-speed motor vehicles have resulted in a worldwide explosion in the number of chest injuries. As the chest is a vast and exposed area, it is susceptible to trauma in the majority of impact injuries. [6] As the thoracic cage contains the most essential organs, including the heart, lungs, and major vessels, harm to these organs can be fatal.[5]

Thoracic trauma is one of the most prevalent forms, accounting for 10% of admitted traumas to emergency services. It primarily affects young males between the ages of 20 and 30 and is regarded as a significant preventable cause of mortality, as it is typically caused by automotive accidents and injuries inflicted by white weapons and firearms.[7-9]

Thoracic trauma is categorized as:[10]

1. **OPEN / PENETRATING:** Penetrating injuries, such as piercing, cutting, and gunshot wounds, disturb the integrity of the tissue.
2. **CLOSED / BLUNT:** Blunt impacts can damage organs and structures beneath the tissue without compromising the tissue's integrity.

BCI is more prevalent than piercing chest injury and has unique pathophysiological characteristics.[11] In 90% of instances, blunt trauma is

the predominant cause of injury. They have a minimal likelihood of requiring surgery, but the kind of the damage will decide its severity.[12]

Due to the rising occurrence of traffic accidents, blunt chest injuries are one of the most significant problems in civil practice.[13] Chest trauma is a common occurrence in the context of stressful events that occur most frequently in young adults between the ages of 15 and 35.[14] Most frequently damaged by blunt trauma are the chest wall and soft tissues. [13] Other than mortality, trauma is the leading cause of impairment and loss of healthy lives in this age range.[2] Chest trauma is a common cause of harm in these individuals, posing a threat not only to the airway, breathing, and circulation, but also to the patient's life. Twenty to twenty-five percent of fatalities resulting from traumatic injuries are caused by chest injuries and the mortality associated with blunt chest trauma.[15]

According to the National Trauma Database (NTDB), 13.8% of blunt trauma patients get chest injuries. The global death rate associated with chest trauma is 8.4%. The mortality rate associated with blunt thoracic trauma ranges between 9.5% - 47.5%, depending on the severity of the damage. The leading cause is motor vehicle collision (MVA), followed by falls from height, roadside accidents, contact sports, extreme sports, and interpersonal violence. 70-80% of these injuries are caused by motor vehicle collisions.[14,16]

Chest wall injuries are caused by at least one of four primary mechanisms: [1,10]

1. **DIRECT IMPACT:** Direct impact injuries commonly induce focal damage at the impact location. The precise injury relies on a number of variables, including the object's density, the contact area, and the object's velocity.
2. **THORACIC COMPRESSION:** Thoracic compression injuries are caused by organ structures or external objects compressing the chest wall. Compression of the chest wall may cause contusions, lacerations, rib or sternal fractures, harm to solid organs, and overpressure injuries.

3. **RAPID DECELERATION:** Rapid deceleration injuries produce shear forces that can result in tearing injuries to semi-mobile bodily structures at their point of attachment. These injuries are frequently accompanied by compression injuries caused by the chest wall's fast deceleration against an object.
4. **BLAST INJURY:** Blast injuries are caused by the release of great energy from the detonation of explosives that convert solid or liquid matter into gas. Compression, shear, and direct impact forces all contribute to blast injuries.

70% of all chest injuries are blunt traumas. Other than mortality, trauma is the leading cause of impairment and loss of healthy lives in this age range. [2] It is difficult to estimate the mortality rate because the reasons of death in blunt chest trauma include pulmonary and nonpulmonary problems.[17] Injuries to the chest wall and lungs produced by forceful thoracic trauma involve numerous organs, tissues, and systems. With traumatic chest trauma, numerous risk variables increase morbidity and death. Notwithstanding the patient's age, the existence of bone fractures and the number of fractures, mechanical ventilation, and pre-existing chronic lung disorders, co-existing head damage, hypotension, and extrathoracic organ injury were all critical variables.[10,18,19]

Chest trauma is a common cause of harm in these individuals, posing a threat not only to the airway, breathing, and circulation, but also to the patient's life.[14,15] Twenty to twenty-five percent of deaths occurring from traumatic injuries are due to chest injuries, and the mortality rate for blunt chest trauma in the United States and Europe is as high as sixty percent.[14,15] Blunt thoracic trauma is frequently linked with damage to other organs, including chest wall tissues, the thoracic cage, the ribs, the lung, the pleura, the major arteries, the diaphragm, the heart, and the mediastinal structures. Almost two-thirds of patients with chest injuries have rib fractures, which account for 4-10% of admissions to trauma centers.[20] Rib fractures, an indicator of severe trauma, are coupled with

other visceral or skeletal injuries, and in adult patients with BCT, the related injuries have a greater influence on the total death rate.[21] Fractures of a single rib are not deadly. However, the rib fractures are generally accompanied by further injury such as destruction of pleura and lung tissue, pneumothorax, hemothorax, pulmonary contusion and parenchymal laceration, etc. The afflicted rib frequently fractures at the site of blunt contact or at the most vulnerable area, the posterolateral bend.[22]

In the initial assessment of chest trauma patients, six life-threatening conditions should be examined immediately: airway obstruction, tension pneumothorax, open pneumothorax, large hemothorax, flail chest, and pericardial tamponade. [10] Signs and symptoms of thoracic trauma include cyanosis of the fingers, lips, or face, dispnea, tachpnea, or bradipnea, contusion, laceration, perforations, distension, and other specific traumatic findings, hemoptysis, signs of shock (hypoperfusion), tracheal deviation, paradoxical movement of the chest wall, distension jugular veins, decreased or absent breathing sounds.[10]

Vital for the prevention of mortality and sequelae in individuals with blunt thoracic trauma are early diagnosis and treatment. For this reason, the patient's history and physical examination are key components of the diagnostic method. It should be emphasized, however, that some trauma patients may not exhibit these symptoms or may exhibit vague symptoms. Diagnostic examination and imaging techniques of the highest caliber and sensitivity are extremely beneficial and sensitive.[23] Using conventional radiography, computed tomography, magnetic resonance imaging (MRI), and ultrasound, chest injuries can be diagnosed. Due to its speed and widespread availability, conventional radiography remains an important first-line imaging modality for the evaluation of chest injuries in the setting of trauma. CT is the gold standard for imaging examination of trauma patients due to its speed, availability, and sensitivity. MRI is not suggested as a primary imaging modality for chest wall injuries at this time. Long

scanning times, limited availability, and significant safety concerns limit its use in trauma situations. Focused assessment with sonography for trauma (FAST) is widely performed in trauma situations to evaluate for the presence of intra-abdominal free fluid and pericardial fluid.[1]

A few of key procedures can promptly stabilize and revive 85 to 90% of chest trauma patients. Patients with trauma are frequently seen in all emergency rooms, not only those designated as trauma centers. As a result, emergency care professionals must be able to examine, resuscitate, and stabilize any patient with chest injuries.

In contrast to other disease categories, trauma patients typically appear with a known traumatic mechanism, such as a vehicle accident, fall, gunshot wound, or stab wound. Rarely, a patient may appear with a significantly altered mental status and be unable to offer a substantial medical history. In certain instances, physical examination findings such as contusions, lacerations, or abnormalities may indicate the existence of trauma. Crepitus palpation over the chest wall may also be seen.

Chest trauma may manifest as chest discomfort, dyspnea, back or stomach pain, and even syncope in individuals who are awake and coherent. Patients with unstable chest damage may exhibit indicators of acute respiratory distress or profound shock necessitating immediate resuscitation. Patients with unstable chest injuries can also worsen to the point of traumatic arrest, and depending on the mechanism of chest damage, they may be candidates for an emergency department (ED) thoracotomy.[21]

Therefore we proposed a study to assess Clinical profile and outcome of blunt trauma chest.

# AIMS AND OBJECTIVES

1 - To document the predominat mechanism of injury

2 - To evaluate clinical presentation of blunt trauma chest.

3 - To determine the associated injuries

4 - To study the management and outcome

# REVIEW OF LITERATURE

EPIDEMIOLOGY:

Trauma has become a public health issue, with a high frequency around the globe and an association with high morbidity and mortality in both developed and underdeveloped nations. According to the World Health Organization, more than nine people die per minute owing to trauma, which accounts for 12 percent of all diseases.[24,25] The Directorate of Information of the Unified Health System (DATASUS) reports that there were 37,306 road traffic-related fatalities in Brazil in 2015. Physical aggression, automobile accidents, and other forms of urban violence account for 12.5% of all deaths, making them the third leading cause of death in the nation.[26] Trauma disproportionately affects men (80.6%), young adults between 20 and 29 years of age (29%), and motor vehicle accidents (46%) are the leading cause of trauma.[24] In 2030, according to the World Health Organization's report on road safety, road traffic collisions will be the fifth largest cause of death worldwide.[27]

Thoracic trauma (TT) accounts for between 10 and 15 percent of all traumas worldwide. It correlates to the third most fatal type of trauma in the United States, following cranioencephalic trauma and extremities trauma.[28] This rate equates to 7.3% of occurrences in Brazil, making it the second most common type of trauma after extremities trauma.[24] In addition to contributing to another 25% of trauma-related deaths, it accounts for roughly 25% of trauma-related fatalities. It is becoming a big issue in India due to the high incidence of automobile accidents (6% of global traffic accidents), other accidental injuries, crime, and violence. Each year, around 16000 deaths are caused by chest trauma in India alone. [29]

According to the National Trauma Database (NTDB)[30], 13.8% of blunt trauma patients get chest injuries. The global death rate associated with chest trauma is 8.4%. The mortality rate associated with blunt thoracic trauma ranges between 9.5% and 47.5%, depending on the severity of the

damage. Accidents involving motor vehicles (MVA) are the leading cause, followed by falls. 70-80% of these injuries are caused by motor vehicle collisions.

**PATHOPHYSIOLOGY:**

Tissue hypoxia is a consequence of severe chest trauma. This may be caused by hypovolemia, pneumothorax, cardiac damage, or mismatched ventilation and perfusion in the wounded lung.

Hypercarbia develops due to:

i. associated blockage of the upper airways
ii. Pain-related restriction of respiratory movement
iii. Mechanical factors such as a flail segment

A metabolic acidosis (hypovolaemia or hypoperfusion) or respiratory acidosis may be present (hypoventilation). [31]

**INJURIES COMMONLY ASSOCIATED WITH BLUNT CHEST TRAUMA:[31]**

**Immediate life-threatening injuries**

- Airway obstruction
- Tension pneumothorax
- Flail chest
- Rib fracture
- Massive haemothorax
- Cardiac tamponade

**Potentially life-threatening injuries**

- Traumatic aortic injury
- Pulmonary contusion
- Myocardial contusion
- Diaphragmatic rupture
- Oesophageal rupture
- Tracheobronchial rupture

**Airway obstruction:**

Head, face, cervical spine, and airway injuries typically result in airway obstruction. Airway blockage is characterized by noisy upper airway noises, the usage of respiratory accessory muscles, hypoxia, and hypercarbia. High oxygen flow is provided. The treatment consists of simple airway maneuvers (such as a chin lift or jaw thrust), the use of airway conduits, and formal intubation; a tracheostomy may be necessary.[10]

**Tension pneumothorax:**

This potentially fatal syndrome is characterized by hypoxia, tachypnea, hypotension, reduced breath sounds with hyperresonance on the affected side, tracheal deviation away from the affected side, and high central venous pressure. [21]

**Flail chest:**

A flail chest develops when three or more ribs are fractured in two or more locations. Eventually, paradoxical chest movement is accompanied by hypoxia and hypercarbia. A flail chest happens when a portion of the chest wall becomes separated from the remainder of the chest wall. As the flail segment loses its continuity, the chest wall moves in a paradoxical manner during inspiration and expiration. A flail chest is always accompanied by pulmonary contusion (and frequently cardiac contusion). Frequent causes of flail chest include direct hits, falls from great heights, and automobile accidents. Typically, flail chest is accompanied by secondary injuries, such as extrathoracic organ damage, shock, and blood loss. The death risk for patients with such additional injuries ranges between 10 and 20 percent. [32,33] This makes hypoxia worse. Principal therapeutic options include high-flow oxygen, analgesia, and strategies to maintain lung volume and functional residual capacity. If the injury involves bilateral flail segments, ribs are occasionally surgically fixed.

**Rib fracture:**

In blunt thoracic trauma, the most common damage is chest wall injury, which includes rib fractures. Fractures of a single rib are not deadly. Nevertheless, rib fractures are typically accompanied by other injuries, such as injury to the pleura and lung tissue, pneumothorax, hemothorax, pulmonary contusion, and parenchymal laceration, etc. The afflicted rib frequently fractures at the site of blunt contact or at the most vulnerable area, the posterolateral bend. First rib fractures have a significant mortality rate of 36% due to the risk of subclavian vascular and brachial plexus injury.[34] The ribs 4 to 9 are highly susceptible to forceful damage. These midzone rib fractures are frequently linked with pulmonary contusion, laceration, hemothorax, and pneumothorax. Last two ribs are more movable and less likely to be shattered; fractures may cause liver, spleen, and kidney damage. [35]

**Massive haemothorax:**

Massive haemothorax frequently results from damage to big blood vessels and is characterized by shock, hypoxia, absence of breath sounds, and dullness to percussion on the affected side. It is essential to know that a chest X-ray will not reveal collections of less than 200 ml. Chest films taken with the patient supine reveal diffuse radiodensity on the afflicted side. The patient will need volume expansion and installation of a chest drain. Surgical intervention is necessary if the first drain output exceeds 1500 ml. [31]

**Cardiac tamponade:**

The classical signs of cardiac tamponade are hypotension, rising central venous pressure and muffled heart sounds (Beck'striad). A globular heart may be visible on X-ray.[31]

**Traumatic aortic injury:**

In road traffic accidents, traumatic aortic injuries are the second leading cause of death after head injuries. Typically, high-speed deceleration is associated with these injuries. Lately, airbag deployment has been linked

to aortic rupture. Multisystem injuries are also substantially associated with traumatic aortic damage. Ninety to ninety-eight percent of traumatic lesions are situated near the isthmus of the aorta. Several degrees of aortic injury include intimal haemorrhage, intimal haematoma with laceration, medial laceration, complete laceration, false aneurysm, and free rupture with peri-aortic haemorrhage. The risk of death associated with blunt traumatic dissection of the descending aorta is significant (a mortality rate of 85 percent has been cited). The majority of these individuals pass away before to hospitalization. [10]

**Pulmonary contusion:**

The most prevalent potentially fatal damage in blunt thoracic trauma is pulmonary contusion. When the inflamed process in the wounded lung parenchyma progresses, respiratory failure develops over time. Mechanical parenchymal injury occurs initially, followed by oedema and hemorrhage. After all, the predominant responses are inflammatory, hormonal, and metabolic. Pain and irregular chest wall motions, which lead to hypoxic respiratory failure, impede this process. [36]

**Myocardial contusion:**

Myocardial contusion may show subtly, yet it is more often than previously believed. A sternal fracture or seatbelt mark should always alert the clinician to the possibility of a heart contusion. Symptoms are frequently obscured by chest wall and lung damage. ECG abnormalities, elevated troponin T, repeated rise of CK-MB isoenzyme concentrations, and echocardiographic abnormalities mostly corroborate the diagnosis. [37]

**Diaphragmatic rupture:**

While the diaphragm is strongly linked with the liver on the right, it is more frequent to diagnose a rupture on the left side. The severity of symptoms is proportional to the amount of intestinal contents herniating into the thoracic cavity. [31]

**Oesophageal injury:**

This illness is characterized by significant chest discomfort, signs of air and fluid in the mediastinum and pleural cavity, and indications of mediastinitis-related shock. A gastroesophageal swallow can confirm a diagnosis. [10]

**Tracheobronchial injury:**

Injury to the tracheobronchial tree results in pneumothorax and continuous air leakage. It results from high-energy strikes and is therefore frequently linked with other essential organ damage (e.g. aortic, hepatic). With flexible bronchoscopy, the diagnosis can be confirmed.[10,31]

**Kerr-Valentic MA, Arthur M et al (2003)[38]** The severity and duration of pain and disability in patients with rib fractures who were treated according to the current standard of care were determined. This was a sequence of predicted cases. Individuals diagnosed with one or more rib fractures by chest radiography between June 1, 2001 and October 31, 2001 were invited to participate. Pain levels were assessed on days 1, 5, 30, and 120 after injury using a visual pain scale (0–10). Disability was measured using the SF-36 Health Status Survey at 30 days, and the total number of days off from work/usual activity was recorded at 120 days. That took occurred in a Level I trauma center linked with a university. The average number of rib fractures among the participants was 2.7±1.6. 23 patients had isolated rib fractures, whereas 17 also sustained extrathoracic injuries. At 30 days, the average pain from rib fractures was 3.5±2.1 and at 120 days, it decreased to 1.0±1.4. Rib pain in patients with extrathoracic injuries was equivalent to pain in the rest of the body at all time periods. Patients were significantly more disabled at 30 days ($p< 0.001$) in all categories compared to the chronically ill reference population of the RAND Medical Outcomes Study, with the exception of emotional stability, where they demonstrated equivalent disability, and perception of general health, where they were significantly less disabled ($p< 0.001$). The total average number of work/normal activity days missed was 7041. Individuals with

isolated rib fractures returned to work/normal activities an average of 5139 days earlier than those with extrathoracic injuries ($p < 0.01$). In individuals with isolated thoracic injury and concomitant extrathoracic injury, rib fractures are a significant cause of pain and disability. The prognosis for rib fracture patients would be vastly improved by the development of innovative medicines to accelerate pain reduction and healing.

**Sırmalı M, Turut H et al (2003)**[39]The researchers analyzed the morbidity and mortality rates as well as the management of rib fractures. They investigated retrospectively 1417 patients who attended to their clinic for thoracic trauma between May 1999 and May 2001. Five hundred forty-eight cases (38.7%) had fractured ribs. The median age of the 331 men and 217 women was 43 years (range: 5–78 years). These patients were separated into groups based on their age, number of broken ribs, and status, i.e. whether they were stable or unstable (flail chest). In 330 instances, trauma was induced by motor vehicle accidents, 122 instances by falls, 54 instances by assaults, and 42 instances by occupational accidents. Pulmonary sequelae were seen, such as pneumothorax (37.2%), hemothorax (26.8%), hemo-pneumo-thorax (15.3%), pulmonary contusion (17.2%), flail chest (5.7%), and isolated subcutaneous emphysema (2.2%). In 40.1% of rib fracture patients, intensive care units provided treatment. The average length of their stay in the intensive care unit was 11.8± 6.2 days. With a mean duration of stay of 4.5±3.4 days, 42.8% of cases were treated on the wards; 17.1% of cases were followed up in the outpatient clinic. 27 individuals required surgical procedures. The mortality rate was calculated to be 5.7% (n = 31). Rib fractures can be viewed as indicators of serious trauma. The fatality and morbidity rates rise as the number of shattered ribs increases. Patients with isolated rib fractures who have at least three broken ribs should be hospitalized.

**Liman ST, Kuzucu A et al (2003)**[13] found the disorders associated with traumatic chest injuries and investigated the proper identification of people at high risk for severe chest trauma. The author analyzed their experience

with 1,490 patients admitted with blunt chest injuries over the course of two years. Patients were divided into three unique groups based on the presence of rib fractures. To investigate the relationship between the number of rib fractures and other injuries, the groups were evaluated. The possible influence of age and Injury Severity Score (ISS) on mortality was assessed. The average period of hospitalization was 4.5 days. The death rate for patients with blunt chest injuries was 1%, 4.7% for those with more than two rib fractures, and 17% for those with flail chest. There was a substantial correlation between the fatality rate, the number of rib fractures, the age of the patient, and the ISS. 6.7% of patients without rib fractures experienced pneumothorax and/or hemothorax, compared to 24.9% of patients with one or two rib fractures and 81.4% of patients with three or more rib fractures. There was a significant correlation between pneumothorax or hemothorax and the amount of rib fractures. Obtaining better outcomes in the treatment of patients with chest wall injuries is dependant on a variety of variables, according to the study's conclusion. With chest trauma, more than two rib fractures, patients older than 60 years, and an ISS more than or equal to 16 were associated with an increased risk of mortality. Patients who are at a high risk for morbidity and mortality, as well as the most effective treatments for them, should be recognized.

**Bergeron E, Lavoie A et al (2003)**[40] reveals that elderly patients admitted with rib fractures after physical trauma had a greater probability of mortality. From April 1, 1993 to March 31, 2000, our trauma registry collected demographic, injury severity, and outcome data on a cohort of consecutive adult trauma admissions with rib fractures to a tertiary care trauma centre. There were 405 (9.4%) patients with rib fractures among the 4,325 hospitalizations for blunt trauma; 113 were over 65 years old. In 54.8% of instances, the Injury Severity Score (ISS) was greater than 16, the average hospital stay was 26.8± 43.7 days, and 28.6% of patients required mechanical ventilation. Death (19.5% vs. 9.3%; $p < 0.05$),

comorbidity (61.1% vs. 8.3%; p< 0.0001), and falls (14.6% vs. 0.7%; p< 0.0001) were significantly higher in patients aged > 65, despite a significantly lower ISS (p = 0.031), higher Glasgow Coma Scale score (p=0.0003), and higher Revised Trauma Score (p< 0.0001). After adjusting for severity (i.e., ISS and Revised Trauma Score), comorbidity, and multiple rib fractures, the mortality risk for individuals over 65 was five times that of those under 65. Despite decreased injury severity indices and taking into account comorbidities, the mortality rate for older patients with rib fractures admitted to a trauma hospital was significantly raised.

**Khan MLUZ, Haider J et al (2009)**[41] Determined the predominant injury pattern following chest trauma and assessed the efficacy of the therapeutic alternatives used in the general surgical unit of a trauma care hospital. This prospective Case Series study was conducted between September 2007 and February 2009 at the Surgical Unit-II and Unit-VI of Civil Hospital Karachi. One hundred and three consecutive patients with thoracic trauma were assessed at the emergency department. Individuals who arrived with chest trauma alone or in conjunction with other injuries and were older than 12 were included. Investigations were conducted on 103 patients with various chest injuries over the course of 18 months. 58% of patients had blunt chest injuries, compared to 42% who had penetrating lesions. Thirty patients (29%) with chest wall injuries (rib fracture, mild lung contusion) were treated conservatively with neither pneumothorax nor hemothorax. In 64 (62%) hemothorax/pneumothorax patients, chest intubation was required. Two of the nine (9%) patients who required a thoracotomy were emergency cases, whereas the remaining seven were elective. The death rate was 8% overall. In conclusion, chest penetrating injuries are on the rise due to an increase in gunshot wounds, whereas blunt trauma remains more common. Few patients with chest injuries require substantial operational treatment. The majority of patients with chest injuries can be efficiently treated in a normal surgical institution.

**Hassani AL, Abdulrahman H et al (2010)**[42] Determine if an association exists between the pattern of rib fractures and the incidence of thoracic and solid abdominal organ injury. Rib fractures were divided into three zones: upper zone (1 to 4 ribs), midzone (5 to 8 ribs), and lower zone (9 or more ribs) (9 to 12 ribs). The quantity and location of rib fractures indicated the presence of sternal and scapular fractures, pulmonary contusions, and solid organ damage (liver, spleen, and kidney). There were 296 men and 14 women in the group. There were 38 patients identified with scapular fractures and 19 patients diagnosed with sternal fractures. There were 90 individuals with 116 cases of solid organ injury, including liver (n = 542), kidney (n = 527), and spleen (n = 442). Relative to fractures in the upper and middle rib zones, zone-limited or overlapping lower rib fractures were substantially predictive of solid organ injury. In patients with upper zone fractures, scapular and sternal fractures were more prevalent, and the prevalence of pulmonary contusions rose with the number of rib fractures. In this series, there was a 51% correlation between multiple fractures of the lower ribs and damage to solid organs. In conclusion, the rising incidence of rib fractures raised the likelihood of secondary chest wall and pulmonary injuries but had no effect on the incidence of damage to solid organs.

**Jones KM, Reed RL et al (2011)**[21] The researchers investigated the relationship between mortality and the number of rib fractures, patient age, and severity of intrathoracic and extrathoracic injuries. National Trauma Data Bank codes for death, age, number of fractured ribs, intrathoracic and extrathoracic injuries, and Abbreviated Injury Score were extracted. Multivariate logistic regression found that the severity of intrathoracic injury had the highest influence on mortality, followed by severity of extrathoracic injury, age 65 or older, more than five rib fractures, and age 46 to 65. The mortality rate for isolated rib fractures ranged from 1.8% to 3.0%. The mortality associated with rib fractures is independently affected by severe intrathoracic injury, the presence of extrathoracic injury,

advanced age, and the presence of more than five fractured ribs, according to the results of the current study. Individuals with certain diseases may benefit from a higher level of care intensity.

**Soderlund T, Ikonen A et al (2014)**[43] Identified variables associated with the outcome of patients with severe thoracic injuries. This is a retrospective investigation of a single trauma center. Individuals brought to the hospital after blunt trauma with a major thoracic injury (thoracic Abbreviated Injury Scale (AIS) > 2) are included in the study. Individuals with thoracic spine injuries that were isolated and dead were excluded from the research. Vital signs, laboratory results upon admission, care provided, intensive care unit and hospital length of stay, injuries, and in-hospital mortality were collected for the study. The study included 594 patients over a five-year period (2003–2007). Patients had an average age of 45, and 76.9% were male. The average Injury Severity Score was 22, and the typical patient sustained 5.5 injuries. The death rate was 6.4% overall. In the multivariate analysis, mortality was associated with base excess and tromboplastin time at admission. There was no link between the number of rib fractures and the outcome measures; however, the presence of bilateral rib fractures was associated with outcome indicators outside mortality. The number of rib fractures in blunt trauma patients with substantial thoracic injury did not correlate with mortality or length of stay in the intensive care unit.

**Feng Lin FC, Yun Li R et al (2016)**[44] This study aimed to understand the clinical course of traumatic rib fractures and to identify risk factors for mortality and morbidity. This retrospective cohort study was conducted with the approval of the Institutional Review Board on consecutive patients with blunt thoracic trauma who were admitted to the Department of Thoracic Surgery at Tungs' Taichung Metro Harbor Hospital (Taichung, Taiwan) between March 2005 and December 2013. Length of hospitalization, ventilator support, injury severity score (ISS), kind of injury, concomitant injuries, therapies, and mortality were analyzed statistically.

This study included 1621 patients with thoracic trauma, the majority of them were male and ranged in age from 18 to 95 years (mean age, 51.2 years). 11.7% of these patients had a score of 16 on the ISS, and 6.9% had a death rate. 78.5% of them had rib fractures, 31.8% had traumatic hemothorax, 15.6% had pneumothorax, 9.6% had hemopneumothorax, and 4.5% had lung contusion. Fractures of the extremities were the most common injury, followed by head traumas and fractures of the clavicle. Surgery on the extremities (20.6% of patients) and chest tube implantation (22.2% of patients) were the most common therapies. There was a correlation between the number of rib fractures and extended hospital and intensive care unit (ICU) stays (7 days), an ISS of 16, and pulmonary problems including hemothorax, pneumothorax, and hemopneumothorax, but not mechanical ventilation. In addition, age was significantly associated with rib fractures in individuals with thoracic trauma. This investigation determined the severity of traumatic rib fractures. A trauma team must be better equipped in order to give effective treatment procedures for thoracic trauma patients, particularly elderly patients with rib fractures.

**Narayanan R, Subodh Kumar S et al (2016)**[45] Analyses were conducted on the presentation, trends, and outcomes of chest trauma in a level 1 urban trauma center. It was a three-year prospective observational study of all patients who presented to a level-1 urban trauma center with chest trauma. The following data was collected: demographic profile, mechanism of injury, injury severity scores (ISS), concomitant injuries, hospitalization, etc. Mortality and morbidity rates were analyzed and compared to those found in the published literature. The bulk of chest injuries (83.5% of cases) were the result of blunt force, which accounted for 30.9% of all trauma hospitalizations. Accidents involving motor vehicles were the primary cause of injury (59.7%), followed by assault. In 724 of 1258 patients, rib fractures were the most common chest injury, whereas abdominal visceral injuries were the most common co-injury in polytrauma

cases. The majority of patients did not have surgery. Intercostal tube drainage (ICD) was the primary treatment in 75% of cases, while thoracotomy was only required in 5.56 % of patients. The fatality rate following blunt chest injuries was significantly higher than the overall rate of 11%. Extrathoracic injuries were associated with a higher mortality rate than chest injuries alone, according to the study. The majority of thoracic injuries necessitate basic surgical procedures to prevent immediate death and long-term morbidity, which can be recognized swiftly by thorough and frequent clinical tests in the emergency department.

**Chrysou K, Gabriel Halat et al (2017)**[6] Examined the epidemiological data, treatment, and outcome of polytrauma patients with blunt chest trauma in an effort to improve therapy, reduce complications, and lower polytrauma patient mortality. From June 2012 to May 2014, all polytrauma patients with blunt chest trauma admitted to the emergency room of a tertiary institution were included in this retrospective analysis. Specifics on therapy and outcomes are collected. Inclusion criteria included chest trauma patients with Injury Severity Score (ISS) 18 and Abbreviated Injury Scale (AIS) >2 in multiple body sites. The evaluation of 110 polytrauma patients with chest injuries caused by trauma. The median age of the 82 males was 48.5 years. Accidents involving motor vehicles, falls from a height, and motorbikes accounted for the majority (>75%) of blunt chest injuries. Rib fractures, pneumothorax, and pulmonary contusion were the most frequent chest injuries. The majority of patients (64.5%) were diagnosed with a severe chest injury (AISthorax 3), 19.1% were diagnosed with a severe chest injury (AISthorax 4), and 15.5% were diagnosed with a moderate chest injury (AISthorax 2). 90% of patients with chest injuries were treated conservatively. In 54.5% of patients, chest tube implantation was advised. The need for a chest tube was significantly higher in the AISthorax 4 group than in the AIS 3 and 2 groups ($p< 0.001$) Moreover, ICU admission was proportional to AISthorax severity ($p< 0.001$). There was no link between chest injury severity and ICU length of

stay, days of intubation, complications, or fatality. Despite the fact that 84.5% of patients had moderate or severe chest injuries, neither the conservatively treated nor the surgically treated group demonstrated a significant impact of injury severity on ICU stay, intubation days, complications, or mortality. The association between AISthorax and chest tube insertion and ICU hospitalization rates was unique. The majority of patients who were treated with early installation of chest tubes when appropriate, pain management, and chest physiotherapy had satisfactory results.

**Sharma P, Jakhmola CK (2018)**[46] evaluated the presentation and outcome of thoracic injuries at a hospital providing tertiary care. It was a prospective observational study of all hospitalized thoracic injury patients over a three-year period. In addition to comparing and assessing the rates of morbidity and mortality, the researchers evaluated the therapy and the outcome. In addition, concomitant injuries were documented and evaluated. 18.2% of all trauma hospitalizations were for thoracic injuries, and in 89.1% of these cases, the cause was blunt. Accidents involving motor vehicles (62.2%) and assault were the leading causes of injury. In 214 out of 314 cases, rib fracture was the most prevalent chest injury, whereas abdominal visceral injuries were the most prevalent co-injuries in polytrauma. Combined extrathoracic and thoracic injuries lead to a higher mortality rate than chest injuries alone. The majority of patients did not have surgery. In 82% of cases, installation of an intercostal drainage tube was the most common treatment, whereas thoracotomy was required in only 3.12% of patients. The overall rate of death was 5.41 percent. In conclusion, thoracic injuries can be promptly identified in the emergency room and require modest surgical interventions in the majority to avert immediate mortality and morbidity. To prevent further worsening and long-term repercussions, it is vital that these patients undergo comprehensive and periodic clinical examinations.

**Birse F, Williams H et al (2019)**[47] addressed the fact that older adults (>65 years) are more likely to come with trauma to the ED. The most common mechanism following which these patients present is a fall from a standing position, and the most common non-spinal injury is a rib fracture. Injury to the thoracic region is connected with substantial morbidity and mortality in individuals aged 65 and older. There are currently no universally applicable evaluation, investigation, or therapy guidelines for such patients. They evaluate the scientific basis and therapeutic treatment choices applicable to this vulnerable patient population.

**Alam KT, Rahman S et al (2019**)[48] investigated the presentation, pattern, and management of chest injuries in rural areas. One hundred consecutive patients who reported to the emergency room with thoracic trauma over the course of fourteen months were evaluated. The majority of patients (87%) were treated conservatively with minor wound repair and medical treatment, whereas 13% had installation of an intercostal chest drain. Three of these thirteen percent of patients were referred to higher facilities as a result of initial severe hemothorax and prolonged pneumothorax. The majority of chest injury patients can be satisfactorily treated with conservative therapy or chest drains on the general surgery unit.

**Zhang S, Tang M et al (2019)**[49] The clinical characteristics and therapeutic techniques of patients suffering from traumatic thoracic damage were studied. From January 2003 to January 2018, retrospective data were collected and analyzed on consecutive patients with thoracic trauma. A comparison was made between the characteristics and clinical results of individuals treated by a specialized thoracic trauma team and those who were not. The study included 4,168 patients with a mean age of 49.0 years, of which 82.1% were men. Findings indicated that 42.7% of injuries were the result of motor vehicle collisions. The vast majority of patients (66.8%) had rib fractures. In 48.3% of patients, concomitant injuries were discovered, 86.0% of which were fractures of the extremities.

The majority of patients (33.2%) were managed without undergoing any additional surgical procedures than tube thoracostomy. Twelve percent of the patients needed ICU care. Patients treated by a thoracic trauma team were older (53.5±916.8 vs 45.1±18.0, P<.001), less male (78.3% vs 85.2%, P<.001), had higher injury severity scores (17.5±10.1 vs 13.7±8.2, P<.001), required more ventilator support (48.3% vs 25.0%), and received more tube thoracostomy and other procedures. According to the research, thoracic trauma is more prevalent among middle-aged males in China. Automobile collisions are the greatest cause of death. Fractures of the ribs are the most common type of thoracic injuries. There are numerous connected injuries. Nonoperative treatment and installation of a thoracostomy tube are effective for the majority of individuals. The management of these patients could be improved with a holistic approach and a dedicated thoracic trauma team.

**Akhter Z, Kakroo SM et al (2019)**[14] intended for the evaluation and treatment of Blunt Chest Trauma with Rib Fractures and Related Injuries. This retrospective and prospective hospital-based study was undertaken in Srinagar, J & K, India, at the SKIMS Medical College Hospital. Sixty-four people who reported to the Emergency Department with a history of chest trauma participated in the study. The study included patients between the ages of 18 and 65 of both sexes. Age, gender, injury cause, presence of thoracic injuries, abdominal injuries, and skeletal injuries were recorded and tallied. They observed a considerable male preponderance, as 45 of 64 instances involved males. The greatest cause of injury was automobile collisions, followed by falls from height, heavy object falls, animal assaults, violence, and contact sports. Both thoracic and extrathoracic organs were affected. Musculoskeletal system injuries were also prevalent. Patients were treated according to the ATLS protocol; fifteen patients received intercostal tube drainage, of which four required thoracotomy; four patients required laparotomy for visceral injuries; four patients required fixation of vertebral fractures; and musculoskeletal

injuries were treated according to orthopaedic protocols. Major thoracic injuries claimed the lives of four (6.25%) of the patients in this study. The conclusion of the study was that blunt chest injury is a serious injury that can result in life-threatening complications that must be anticipated, diagnosed, and managed effectively to reduce the occurrence of adverse outcomes. Integration is essential between the general surgeon, anesthesiologist, orthopaedist, internist, and relevant paramedics. Required is a tight adherence to the ATLS protocol. Effective fluid resuscitation, ventilatory support, oxygen inhalation, pulmonary physical therapy, and analgesia can result in a quick recovery and a reduction in the rate of surgical intervention.

**Sinha PK, Sindhu K et al (2019)**[50] In terms of mode of injury, hospital stay, diagnosis, damage severity, proposed treatment, and death, the clinical profile of patients with blunt chest trauma was studied. At the Department of Surgery, Mullana and Ambala, MMIMSR, an observational, prospective clinical study was conducted. For the duration of the study, subjects were chosen using a non-probability, sequential sampling method. 50 consecutive patients satisfying the eligibility criteria were enrolled in the trial after getting informed permission. These surgical ward and intensive care unit patients were surveyed for data collection. Every patient who reported with a suspected diagnosis of blunt chest trauma was admitted to the surgical ward/intensive care unit. SPSS, version 21, was utilized to analyze the data. The average age of individuals with blunt chest injuries was 33.32 years, with nearly two-thirds of cases (64%) occurring between the ages of 18 and 40. 74% of the cases in the study were male, whereas only 26% were female. In 54% of cases, the cause of injury was a motor vehicle collision, while 34% of cases were a fall. 76% of patients revealed a decelerating injury, while 36% of cases revealed polytrauma. The most common presenting symptom was chest discomfort (92%), followed by dyspnea (82%), abdominal pain (24%), and nausea/vomiting (22%). Surgical/subcutaneous emphysema was detected

in 32% of cases. In 52.0%, 26.0%, and 12.0% of cases, respectively, hemothorax, pneumothorax, and pneumo-hemothorax were detected. In 66% and 22% of instances, respectively, the severity of injuries was rated as low to severe. In 12% of cases, a significant damage occurred. In 66% and 22% of instances, respectively, the severity of injuries was rated as low to severe. In 12% of cases, a significant damage occurred. In 36% of cases, conservative therapy was sufficient, whereas surgical intervention was indicated in the remaining cases. In 62% of cases, tube thoracotomy was necessary, while in 36% of cases mechanical ventilation was noted. Laparotomy was required in 20% of cases. 10% of patients had pneumonia, while 4% and 8% of patients, respectively, developed pyothorax and septicaemia. Observations revealed a single instance of acute renal failure and multi-organ dysfunction. Individuals with several injuries had a higher score for injury severity ($p<0.01$). In cases of polytrauma, hospital and intensive care unit stays were significantly longer than in cases of isolated chest trauma ($p<0.05$). This analysis determined that the mortality rate was 4%. In conclusion, young males are more susceptible to blunt chest injuries. Increasing outdoor activities and automobile collisions lead to the rise in chest blunt injuries. Rib fractures were the most common injury, followed by pneumothorax and hemothorax. The most common injury was a fracture of the clavicle, whereas the liver was the most commonly injured abdominal solid organ. Pneumonia was the most common complication, followed by septicemia and pyothorax. In this study, the overall mortality rate was 4%. Polytrauma determined the severity of injuries, leading to a rise in hospital/ICU stays.

**Khursheed SQ, Ashraf W et al (2019)**[5] evaluated the demographic data, pattern of injury, clinical pattern, and result of all chest trauma victims admitted to the department, as well as analyzed the pattern of injury. All patients with chest injuries who presented to the Emergency Department of SKIMS Medical College in Srinagar were analyzed retrospectively. The records of every patient were retrieved. Full information was collected on

age, gender, mode/type of damage, extrathoracic injuries, treatment approach, and result. There were a total of 1429 trauma patients who presented to AE, with 160 (11.2%) suffering from chest trauma. The majority of patients (51.87%, n=83) were between the ages of 21 and 40. A preponderance of guys was observed. Motor traffic accidents were the primary source of chest injuries generated by blunt force, whereas gunshot wounds were the leading cause of chest injuries caused by piercing force. Head and neck injuries were the most common associated injuries. The most common treatment option was tube thoracostomy (65%), while only 28% of patients were handled conservatively. In addition to the severity of chest trauma and associated injuries, prompt diagnosis and treatment were essential for the efficient management of chest injuries. Chest injuries caused by automobile collisions are the major cause of injury. To reduce the incidence of chest injuries, it is vital to establish preventative measures targeted at teaching and strictly enforcing traffic regulations.

**Sharma RG, Sinha PK et al (2021)**[16] In terms of mode of injury, hospital stay, diagnosis, damage severity, proposed treatment, and death, the clinical profile of patients with blunt chest trauma was studied. At the Department of Surgery, Mullana and Ambala, MMIMSR, an observational, prospective clinical study was conducted. For the duration of the study, subjects were chosen using a non-probability, sequential sampling method. 50 consecutive patients satisfying the eligibility criteria were enrolled in the trial after getting informed permission. These surgical ward and intensive care unit patients were surveyed for data collection. Every patient who reported with a suspected diagnosis of blunt chest trauma was admitted to the surgical ward/intensive care unit. The data was analyzed using SPSS version 21. In 66% and 22% of instances, respectively, the severity of injuries was rated as low to severe. In 12% of cases, a significant damage occurred. In 36% of cases, conservative therapy was sufficient, whereas surgical intervention was indicated in the

remaining cases. In 62% of cases, tube thoracotomy was necessary, while in 36% of cases mechanical ventilation was noted. Laparotomy was required in 20% of cases. 10% of patients had pneumonia, while 4% and 8% of patients, respectively, developed pyothorax and septicaemia. Observations revealed one case each of acute renal failure and multi-organ dysfunction. Individuals with several injuries had a higher score for injury severity ($p<0.01$). In cases of polytrauma, hospital and intensive care unit stays were significantly longer than in cases of isolated chest trauma ($p<0.05$). This analysis determined that the mortality rate was 4%. In conclusion, young males are more susceptible to blunt chest injuries. Increased outdoor pursuits and vehicular traffic.

**Walia BS, Dugg P et al (2021)**[51] A retrospective analysis was conducted to analyze the treatment and outcome of all chest trauma patients who presented to the hospital between January 2016 and December 2020. Using hospital data, a five-year retrospective examination of chest trauma patients, including polytrauma (n = 184) was done (2016–2020). Many variables, including demographic profile, injury mechanism, treatment, and outcomes, were examined. The mean age of patients was calculated to be 37±16 years, with a male to female ratio of 2.40:1. The leading cause of trauma was automobile collisions, followed by assaults. The vast majority of patients (55.43%) received conservative treatment. The rate of mortality was only 1.63 percent. The outcome of the study was that trauma is regularly experienced by young male patients. Automobile collisions are the primary cause of injuries. However, the majority of patients can be managed conservatively, and in this study, mortality is reported exclusively in patients with numerous injuries.

**Srivastava A, Kumar R et al (2021)**[52] Analyzed the incidence, different types of chest trauma, investigative procedures, management, morbidity, and mortality associated with chest trauma. The Department of General Surgery at Patna Medical College, Patna, conducted a prospective observational study between July 2014 and June 2016. In the sample,

there were 150 instances of chest injuries. The incidence of chest trauma at our institution is 17.14 percent. In their study, blunt trauma causes chest injuries more frequently than penetrating trauma. Automobile collisions are the leading cause of blunt trauma, whereas stab wounds are the leading source of penetrating trauma. In their study, rib fractures were shown to be the most common type of chest injury, followed by pneumothorax. The thoracic CT scan is important to the diagnosis. The average period of stay for our patients is 8.97 days. According to their research, the death rate is 11.33 percent. According to the findings of this study, the prognosis of patients with chest injuries is improved by rapid diagnosis and treatment, cautious use of radiological tests, and timely surgical intervention.

**Tachino J, Matsumoto H et al (2022)**[53] assessing the clinical characteristics of trauma victims and developing new target demographics and treatment choices. Utilizing statistical machine learning techniques and evaluation of biological profiles, the scientists retrospectively reviewed Japan Trauma Data Bank information to determine the clinical characteristics of trauma deaths. The analysis included 71,038 patients with blunt trauma [median age, 63 (IQR, 40–78) years; 45,479 (64.0%) men; median Injury Severity Score, 13 (IQR, 9–20)], and the derivation and validation cohorts each included 42,780 (60.2%) and 28,258 (39.8%) patients. D-8 (n = 2178) had the highest mortality rate (48.6%) and was further subdivided into four phenotypes: D-8, multiple trauma in the young (n = 464); D-8, head trauma with lower body temperature (n = 178); D-8, severe head injury in the elderly (n = 957); and D-8, multiple trauma with higher predicted mortality than actual mortality (n = 579). Similar phenotypic distributions were seen in the validation cohort. Analysis of the biological profiles of 90 trauma patients revealed that phenotype D-8 exhibited excessive inflammation, including an enhanced acute inflammatory response, dysregulated complement activation pathways, and impaired coagulation, including downregulated coagulation and platelet degranulation pathways.

# MATERIAL AND METHODS

**Source of Data**

This study was conducted in DMC & H Ludhiana. The study included patients presenting from Feb 2021 to July 2022 with blunt trauma chest and hospital course of such patients was be traced.

**METHOD OF COLLECTION OF DATA**

Patients of age between 18 and 70 years were included in the study. The data regarding age, gender, mode of injury, presence of thoracic injuries, abdominal injuries, skeletal injuries was gathered and tabulated.

**INCLUSION CRITERIA**-

All the patients of polytrauma requiring admission.

**EXCLUSION CRITERIA**-

1-Patients below 18 years and above 70 years of age

2-Severly traumatized patients who expired before they could be evaluated for chest trauma

3-Penetrating thoracic injuries

**DURATION OF STUDY** – February 2021 to July 2022

**OUTCOME**

Early investigations, resuscitation and management of the BTC patients can lower the mortality rate upto as much as 80%.

**STATISTICAL ANALYSIS**

The data was compiled in MS excel and was analyzed in SPSS version 26. The data was expressed in terms of frequency and mean values. For comparison of grouped data test and Anova was used and for correlation of variables Pearson correlation was used in present study. the value of $<0.05$ was considered to be significant.

# OBSERVATIONS AND RESULTS

Table 1: distribution of study population according to sex

| | Frequency | Percent |
|---|---|---|
| **Female** | 10 | 10 |
| **Male** | 90 | 90 |
| **Total** | 100 | 100 |

90 (90%) of the patients presenting blunt chest trauma were males, with male female ratio being 9:1.

Figure 1: distribution of study population according to sex

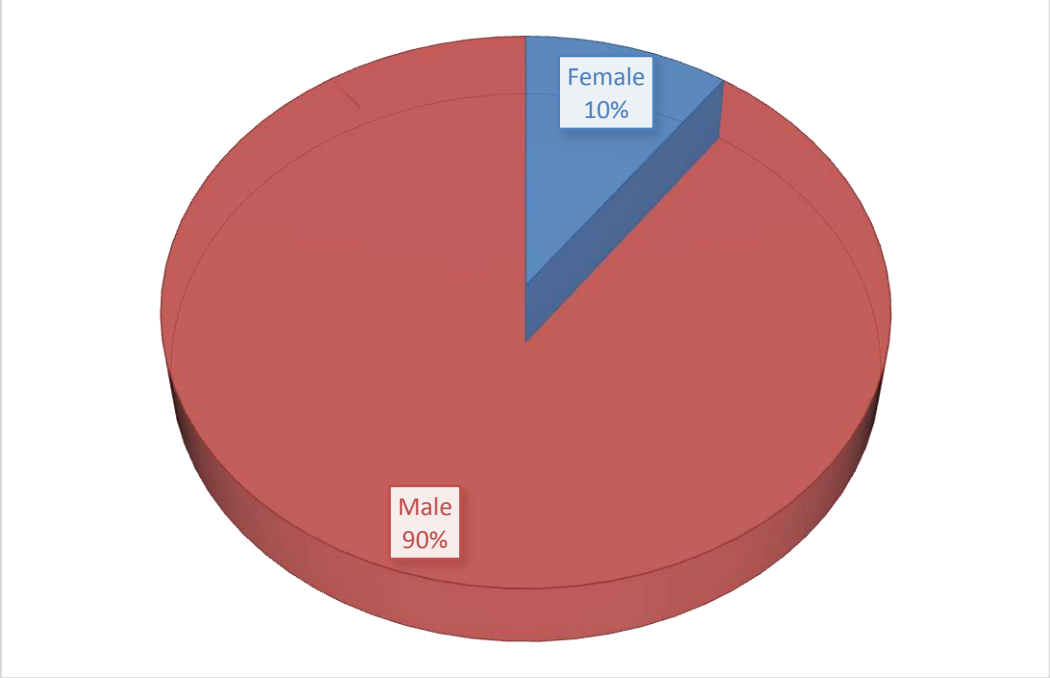


Table 2: distribution of study population according to age

| Age | Frequency | Percent |
|---|---|---|
| **<20** | 8 | 8.0 |
| **21-30** | 18 | 18.0 |
| **31-40** | 21 | 21.0 |
| **41-50** | 21 | 21.0 |
| **51-60** | 19 | 19.0 |
| **61-70** | 13 | 13.0 |
| **Total** | 100 | 100 |

Majority of the patients included in this study belong to the age group 31-50 years with total 42% patients. this was followed by 51-60 years(19%), 21-30 years(18%) , 61-70 years(13%) and least were <20 years . The mean age of the patient was 41.52±7.7 years.

Figure 2: distribution of study population according to age

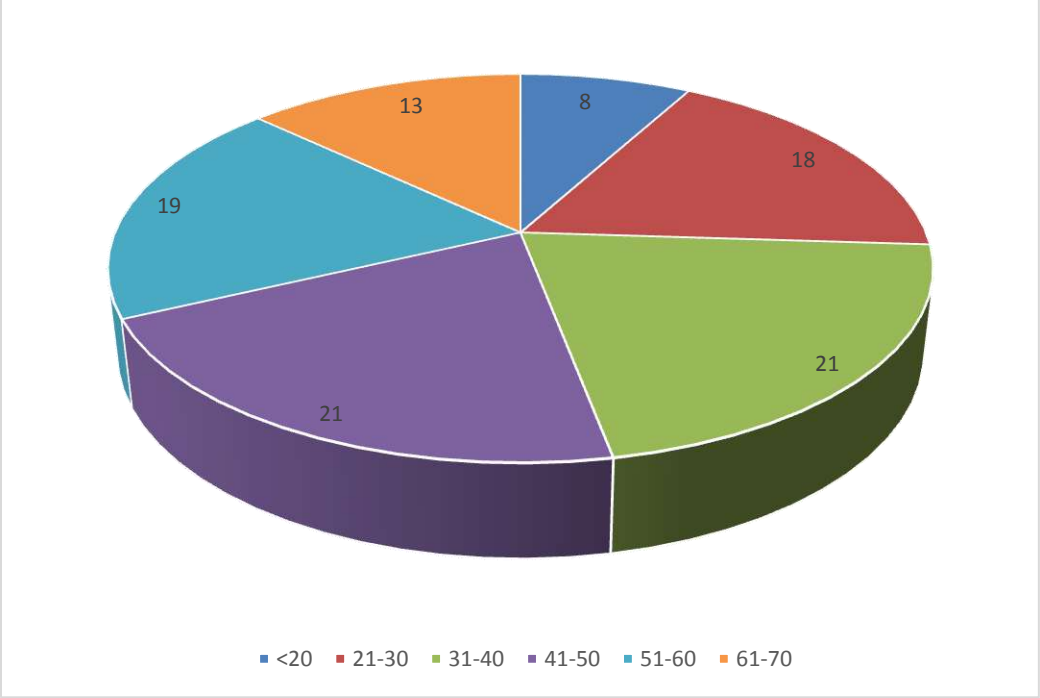


Table 3: Distribution of Study population according to mode of injury

| Mechanism of injury | Frequency | Percent |
|---|---|---|
| **RSA** | 73 | 73 |
| **Fall from height** | 9 | 9 |
| **Assault** | 8 | 8 |
| **Hit by animal** | 6 | 6 |
| **Sports** | 4 | 4 |
| **Total** | 100 | 100 |

Almost 3/4$^{th}$ (73%) of the patients had suffered blunt chest trauma resulting from road side accident (RSA) followed by fall from height (9%), assault (8%), animal hit (6%) and the least from sports (4%).

Figure 3: Distribution of Study population according to mode of injury

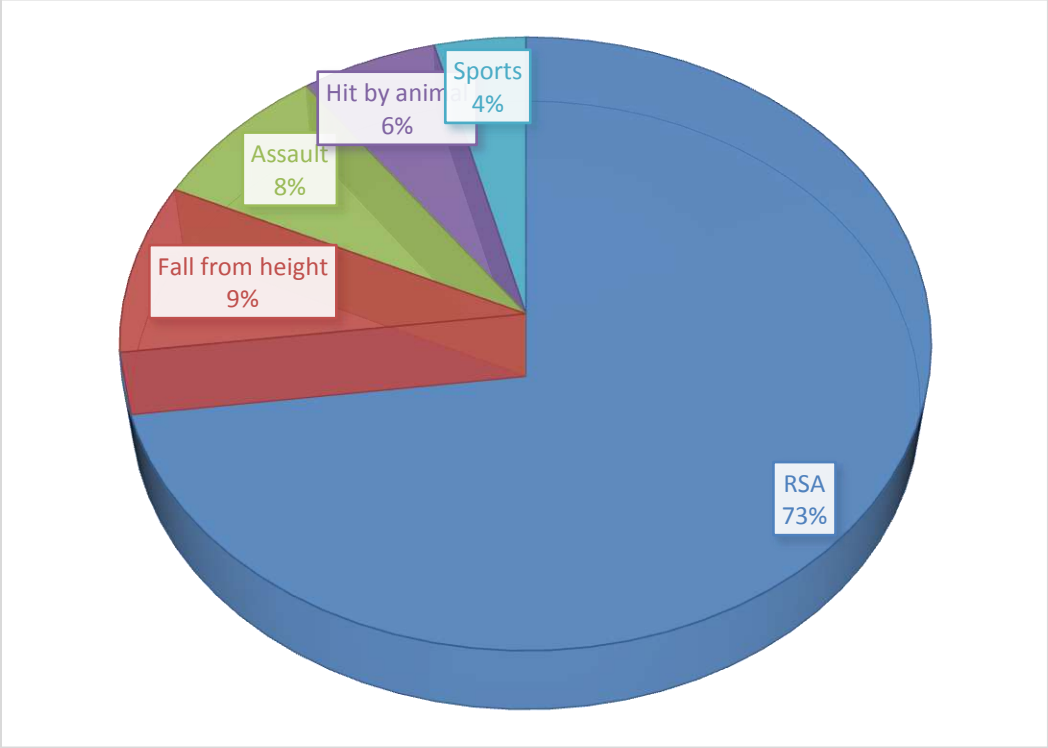


Table 4: Distribution of Study population according to number of fractured ribs

| Rib fracture | Frequency | Percent |
|---|---|---|
| **<=3 fractured ribs** | 70 | 70 |
| **4-6 fractured ribs** | 21 | 21 |
| **>6 fractured ribs** | 9 | 9 |
| **Total** | 100 | 100 |

A substantial majority of the patients (70%) suffered <=3 fractured ribs followed by patients with 4-6 fractured ribs (21%) and >6 fractured ribs (9%)

Figure 4: Distribution of Study population according to number of fractured ribs

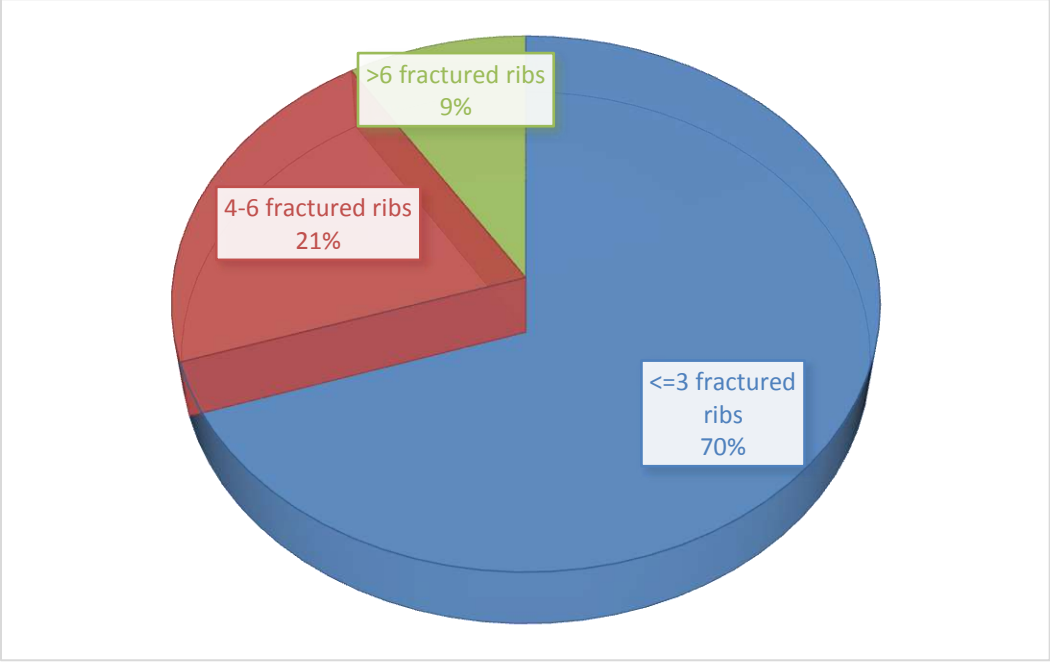


Table 5: Distribution of Study population according to Sign and Symptoms

| Sign and symptoms | Frequency | Percent |
|---|---|---|
| **Chest pain** | 100 | 100 |
| **Breathlessness** | 58 | 58 |
| **Hemoptysis** | 0 | 0 |
| **Abdominal pain** | 12 | 12 |
| **Distension** | 12 | 12 |
| **Inability to move any limb** | 17 | 17 |
| **Cyanosis** | 3 | 3 |

100% of the patients have chest pain while 58% have breathlessness. 12% patients presented with abdominal pain and distension. 17% patients were unable to move heir limb and 3% presented with cyanosis.

Figure 5: Distribution of Study population according to Sign and Symptoms

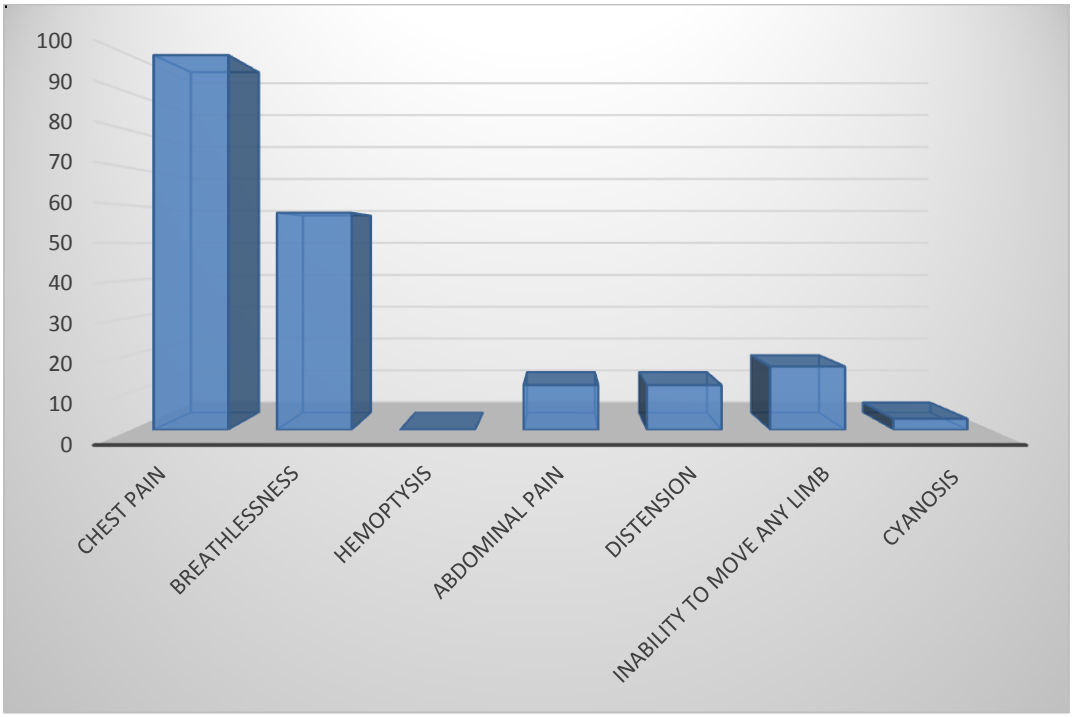


Table 6: Distribution of patients according to associated injuries

| **Other associated injuries** | **Frequency** | Percent |
|---|---|---|
| Head injury | 47 | 47 |
| Fracture clavicle | 43 | 43 |
| Limb injury | 17 | 17 |
| Abdomen injury | 12 | 12 |
| Diaphragm injury | 3 | 3 |
| Fracture scapula | 2 | 2 |
| Fracture sternum | 1 | 1 |

In 47% patients head injury was present along with chest trauma and was the most common type of injury. Clavicular fracture with chest trauma was seen in 43% followed by limb fracture seen in 17%, abdominal injury seen in 12% and diaphragm injury (3%). Fracture scapula and sternum was seen in 2 and 1% patients respectively.

Figure 6: Distribution of patients according to associated injuries

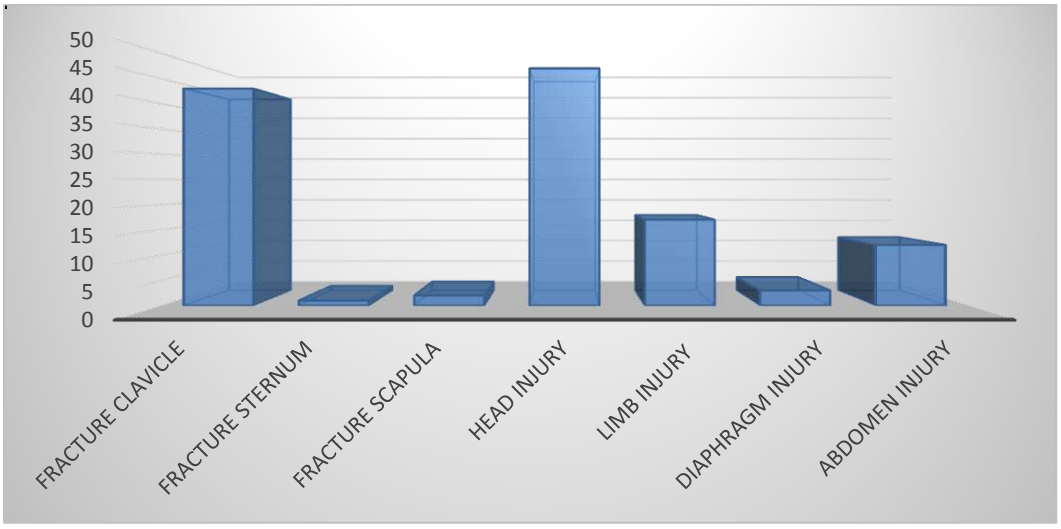


Table 7: Distribution of patients according to diagnosis confirmed by investigation

| Diagnosis confirmed by radiological investigation | Frequency | Percent |
|---|---|---|
| **Pneumothorax** | 37 | 37 |
| **Lung laceration** | 21 | 21 |
| **Lung contusion** | 19 | 19 |
| **Hemothorax** | 12 | 12 |
| **Hemopneumothorax** | 5 | 5 |
| **Injury to tracheobronchial tree** | 4 | 4 |
| **Tensional pneumothorax** | 3 | 3 |
| **Flail chest** | 3 | 3 |

Majority of patients had pneumothorax 37% followed by lung laceration (21%), lung contusions(19%), hemothorax(12%), injury to tracheobronchial tree (4%) and flail chest and tensional pneumothorax seen in 3% each

Figure 7: Distribution of patients according to diagnosis confirmed by investigation

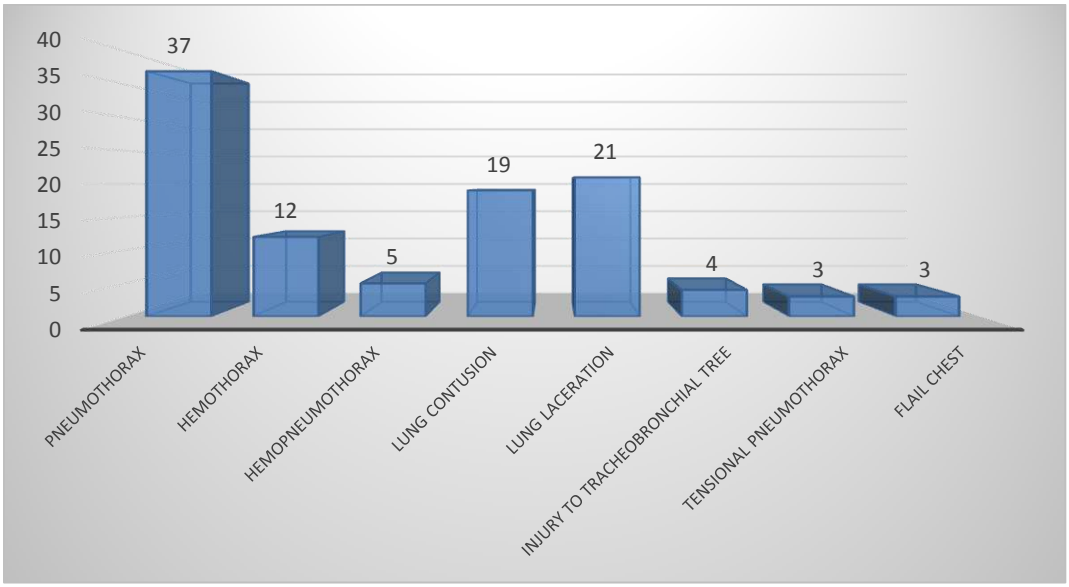


Table 8: distribution of patients according to blood transfusion

| Blood Transfusion | Frequency | Percent |
|---|---|---|
| **Not given** | 72 | 72 |
| **Given** | 28 | 28 |
| **Total** | 100 | 100 |

Blood transfusion was done in 28% patients.

Figure 8: distribution of patients according to blood transfusion

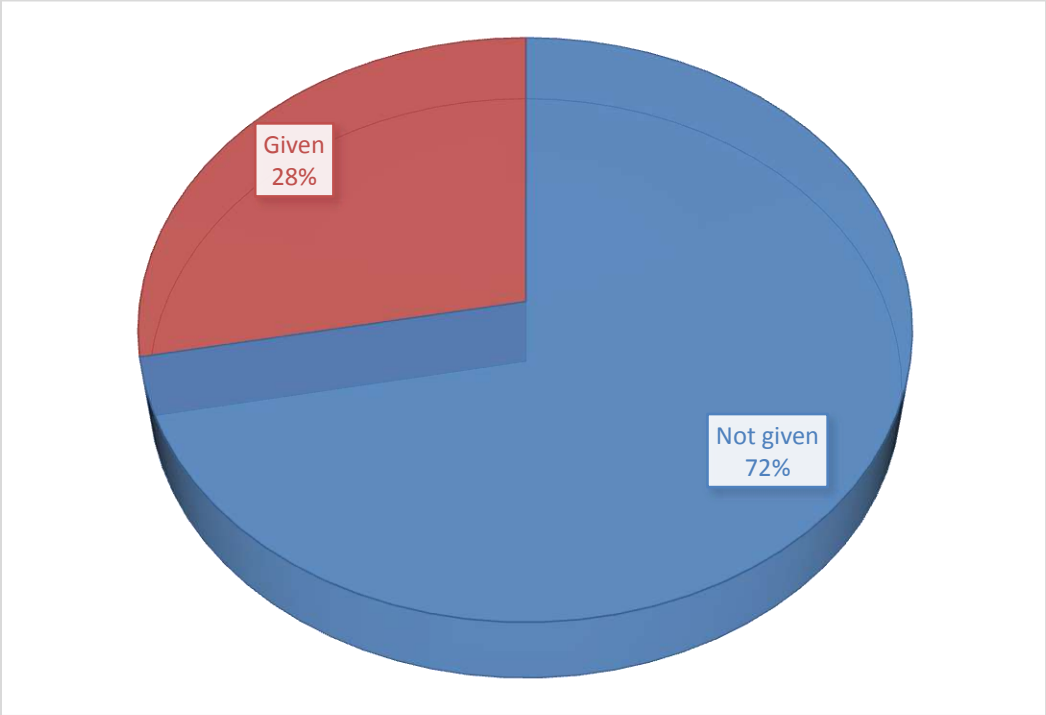


Table 9: distribution of patients according to management

| Management | Frequency | Percent |
|---|---|---|
| **Intercostal tube drainage** | 57 | 57 |
| **Conservatively** | 43 | 43 |
| **Tracheostomy** | 1 | 1 |
| **Diaphragm repair with laparotomy** | 3 | 3 |
| **Laparotomy** | 9 | 9 |

57% patients were managed by intercostal tube drainage while 43% were managed conservatively. Tracheostomy was done in 1% cases. Patients with diaphragm injury underwent diaphragm repair (3%) and with abdominal injury underwent laparotomy (12%).

Figure 9: distribution of patients according to management

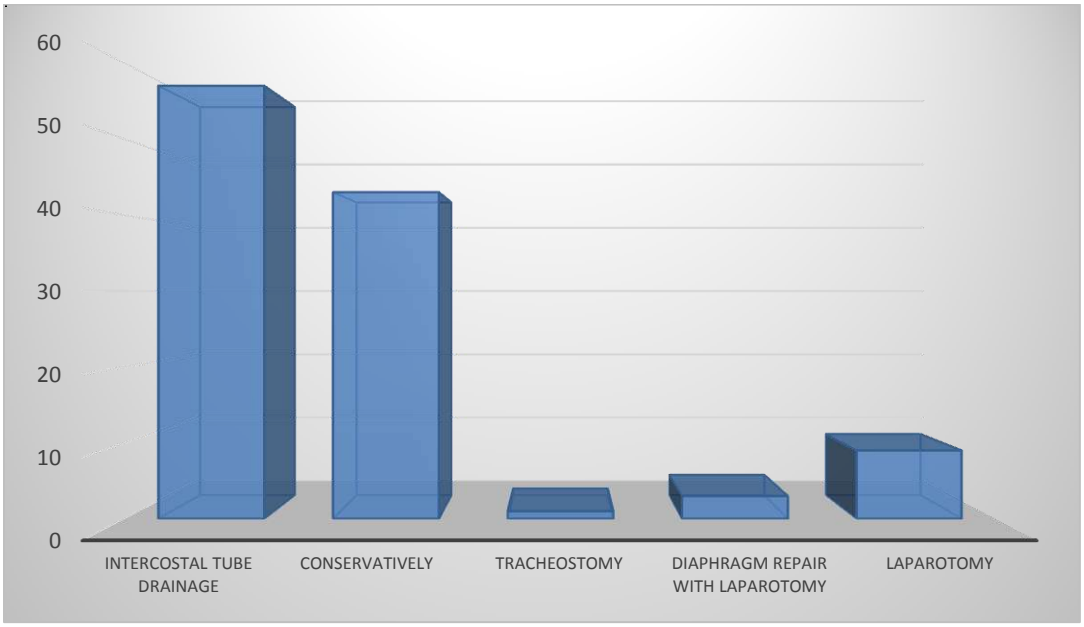


Table 10: distribution of patients according to complications and mortality

| Complications and mortality | Frequency | Percent |
|---|---|---|
| **Shock** | 15 | 15 |
| **mortality** | 4 | 4 |

15% patients presented with shock and were managed accordingly while mortality in our series was 4%.

Figure 10: distribution of patients according to complications and mortality

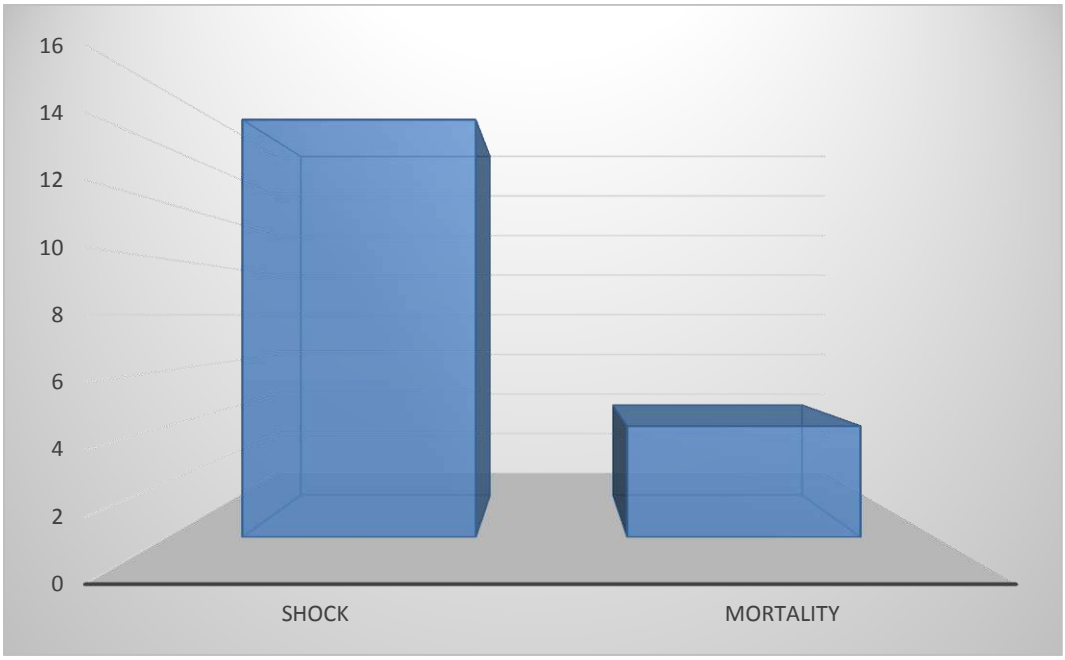


Table 11: descriptive data for grouped variables observed in present study

| | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|
| **Age** | 20 | 59 | 41.53 | 7.70 |
| **GCS** | 9.00 | 15.00 | 13.01 | 2.29 |
| **PR** | 73.00 | 110.00 | 92.74 | 7.23 |
| **BP systolic** | 72.00 | 158.00 | 121.65 | 21.09 |
| **BP diastolic** | 49.00 | 94.00 | 80.56 | 12.72 |
| **SPO2** | 76.00 | 100.00 | 90.64 | 5.80 |
| **RR** | 11.00 | 35.00 | 24.53 | 7.97 |
| **TOTAL RTS** | 7.00 | 12.00 | 10.98 | 1.04 |

The mean age in present study was 41.53±7.70 years(18-83). The Glasgow comma scale mean was 13.01±2.29(9-15), PR was 92.74±7.23(73-110), BP systolic 121.65±21.09(72-158), BP diastolic 80.56±12.72(49-94), SPO2 90.64±5.80(76-100) , RR mean was 24.53±7.97(11-35). The mean revised trauma score was 10.98±1.04(7-12).

Table 12: comparison of revised trauma score with respect to fractured ribs

| **no. of ribs fractured** | **N** | **Mean revised trauma score** | **Std. Deviation** | **f-value** | **p-value** |
|---|---|---|---|---|---|
| **1-3** | 70 | 11.29 | 0.61 | 31.41 | <0.001 |
| **4-6** | 21 | 10.81 | 0.98 | | |
| **>6** | 9 | 9 | 1.58 | | |

The total revised trauma score was 10.98±1.044. Patients with >6 fractures have comparatively more (9±1.58) RTS then with 4-6(10.81±0.98) and 1-3(11.29±0.61) fractures. (p<.001). The intergroup (post hoc) are given below:

On comparing the two groups we observed that

| **(I) rib fracture** | **(J) rib fracture** | **Mean Difference (I-J)** | **Std. Error** | **Sig.** | **95% Confidence Interval** | |
|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound |
| **1-3** | 4-6 | 0.47 | 0.20 | 0.06 | -0.02 | 0.97 |
| | >6 | 2.28 | 0.29 | <0.001 | 1.58 | 2.99 |
| **4-6** | >6 | 1.81 | 0.32 | <0.001 | 1.01 | 2.61 |

We observed that there was significant difference in RTS between patients with 1-3 fractures and >6 fracture and patients with 4-6 and >6 fractures however no significant difference was observed between RTS score between 1-3 and 4-6 fractures.

Figure 11: comparison of revised trauma score with respect to fractured ribs

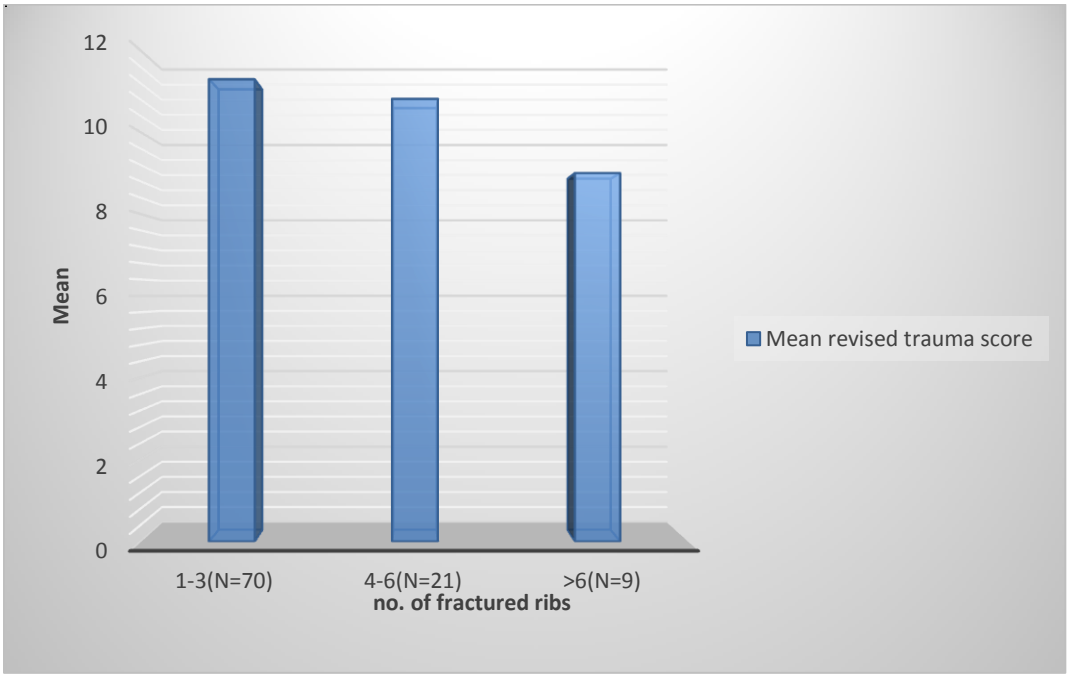


Table 13: hospital stay and ribs fractured

| **no. of ribs fractured** | **N** | **Mean hospital stay (days)** | **Std. Deviation** | **f-value** | **p-value** |
|---|---|---|---|---|---|
| **1-3** | 70 | 8.87 | 2.021 | 65.28 | <0.001 |
| **4-6** | 21 | 10.95 | 2.224 | | |
| **>6** | 9 | 18.44 | 4.667 | | |

We observed that there was significant difference in hospital stay (days) and no. of fractured ribs. The total hospital stay was 10.17±3.6. Patients with >6 fractures have comparatively more (18.44±4.66) hospital stay then with 4-6(10.95±2.22) and 1-3(8.87±2.02) fractures. (p<.001). The intergroup (post hoc) are given below:

| **(I) rib fracture** | **(J) rib fracture** | **Mean Difference (I-J)** | **Std. Error** | **Sig.** | **95% Confidence Interval** | |
|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound |
| **1-3** | 4-6 | -2.081 | 0.595 | 0.002 | -3.53 | -0.63 |
| | >6 | -9.573 | 0.847 | <0.001 | -11.64 | -7.51 |
| **4-6** | >6 | -7.492 | 0.953 | <0.001 | -9.81 | -5.17 |

We observed that there was significant difference in hospital stay between patients with 1-3 fractures and >6 fracture and patients with 4-6 and >6 fractures and between 1-3 and 4-6 fractures.

Figure 12: comparison between hospital stay and ribs fractured

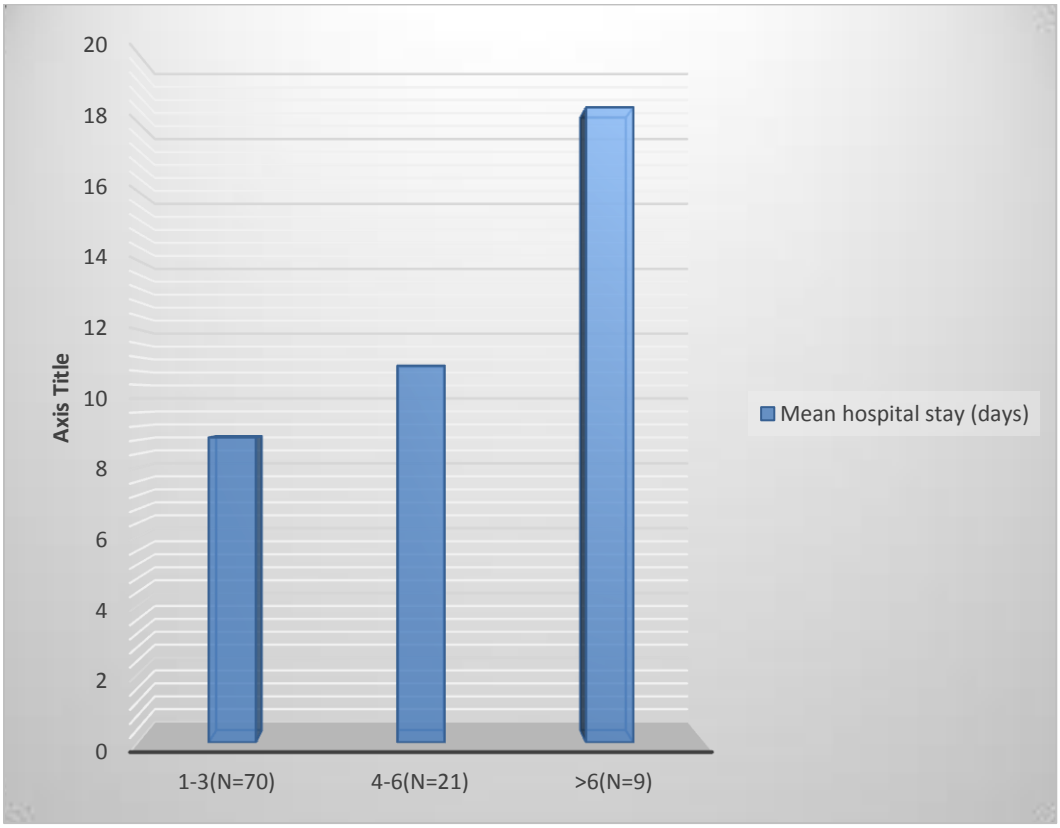


Table 14: comparison between age and fractured ribs

| No. of ribs fractured | N | Mean age | Std. Deviation | f-value | p-value |
|---|---|---|---|---|---|
| **1-3** | 70 | 42.24 | 13.570 | .925 | .400 |
| **4-6** | 21 | 42.29 | 17.493 | | |
| **>6** | 9 | 49.44 | 20.574 | | |

We observed that there was no significant difference in age of the patients (years ) and no. of fractured ribs. However the age in patients with >6 fractures have comparatively more (49.44±20.57 years) then with 4-6(42.29±17.93 years) and 1-3 (42.24± 13.57) fractures. (p >0.05).

Figure 13: comparison between age and fractured ribs

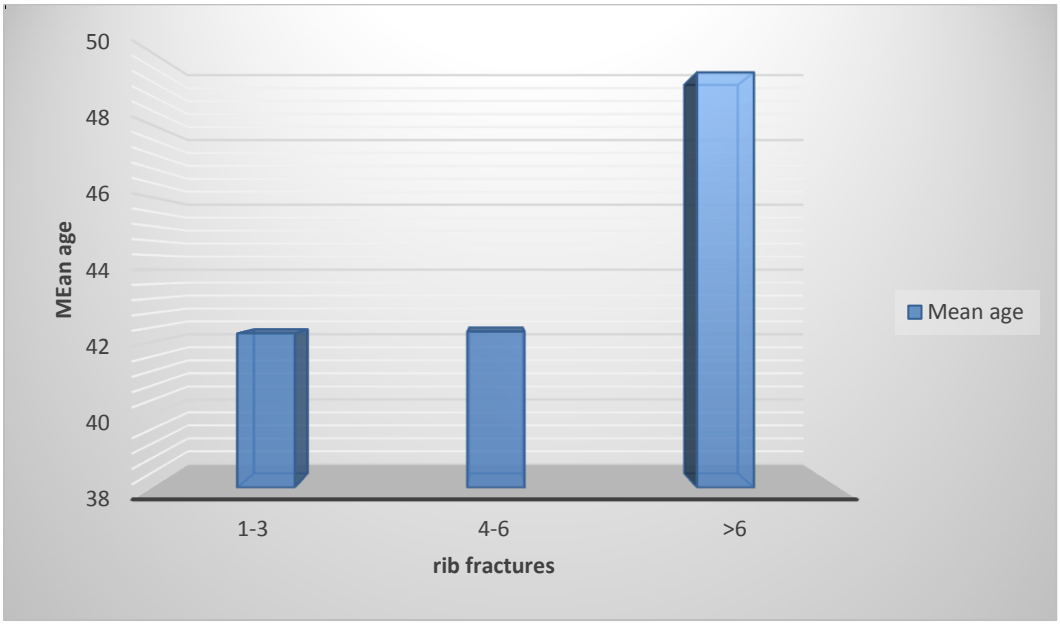


**Table 15: Correlation of Revised trauma score with that of hospital stay**

| | Pearson Correlation | Sig. (2-tailed) |
|---|---|---|
| **Hospital stay** | -.469** | 0 |

There was a moderate correlation between hospital stay and RTS i.e. -469. This signifies the weak negative correlation i.e. on increasing the age RTS moderately decreases.(figure 2.2)

Figure 14: correlation between age and revised trauma score

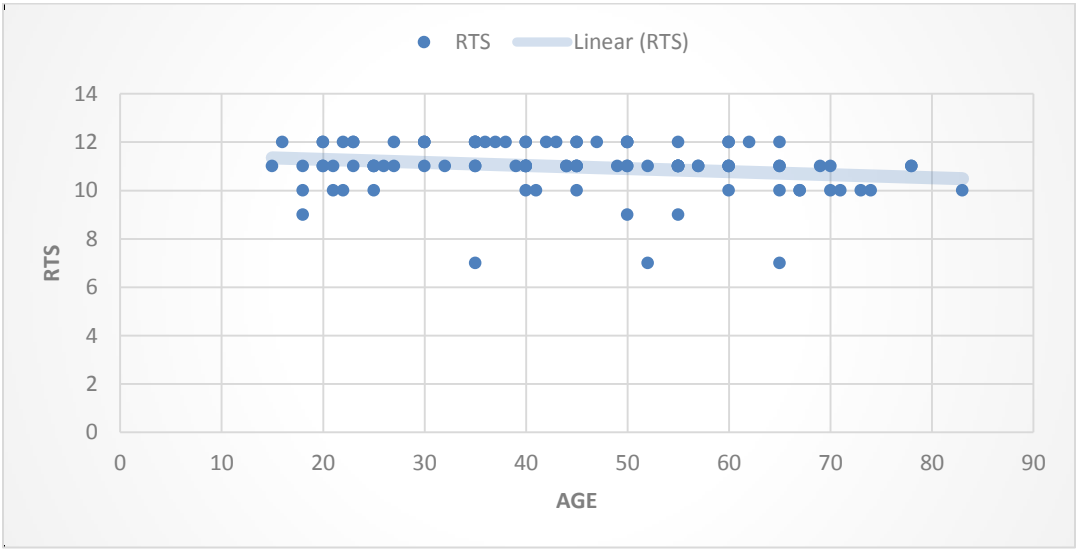
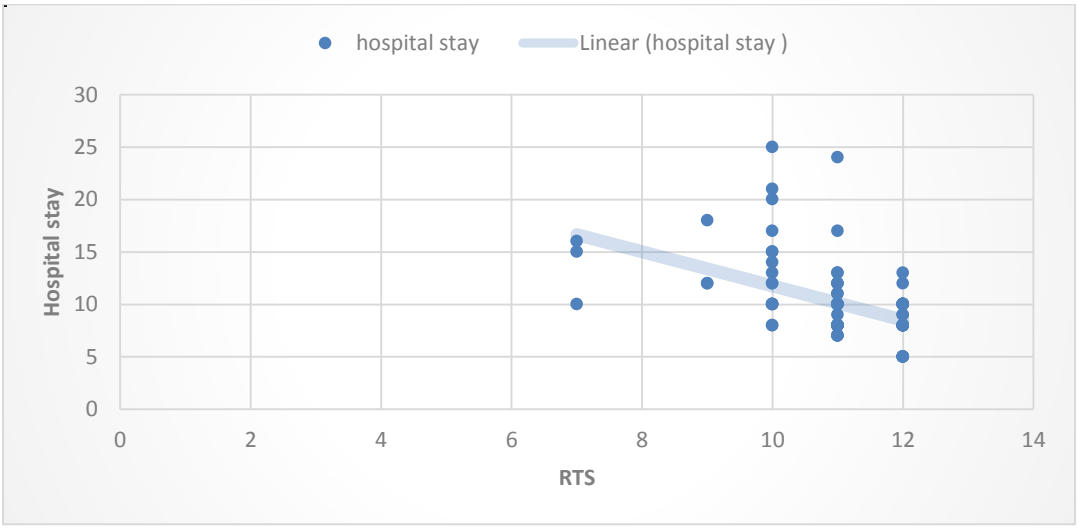



Figure 15: correlation between age and hospital stay



# DISCUSSION

Polytrauma is a serious global health problem.[5] Trauma is the third leading cause of death in all age groups after cardiovascular diseases and cancer.[10] Accidental trauma is one of the leading causes of death in the USA and a significant cause of morbidity. Although trauma-related injuries can occur in many parts of body, one out of four trauma patients die due to thoracic injury or its complications.[10] Due to their immediately life-threatening nature, the identification of thoracic injuries is considered an early priority in the care of the multiply injured patient.[1] Injuries resulting from trauma of various sorts are one of the commonest causes of preventable or avoidable death across all ages and genders but it is the young adults between 15-35 years of age which form the bulk of the victims of traumatic death.[14] Apart from mortality, trauma causes the highest amount of disability and number of healthy lives lost in this age group.

**The present prospective observational study was conducted in Dayanand Medical college the department surgery on patient with blunt chest trauma** to evaluate the mechanism of injury**,** clinical presentation of blunt trauma chest, determine the associated injuries **and** to study the management and outcome.

**The results of the study are discussed below:**

**AGE and SEX**

Majority of the patients included in this study belong to the age group 21-60 years with almost equal distribution across all age decade groups between 21-60 and constituting 74% of the total patients, followed by patients aged 61-70 years (11%); <20 years (9%) ; 71-80 years (5%) and >80 years (1%)patients in total. The mean age of the patient was 44.12±16.9 years. 90 (90%) of the patients presenting blunt chest trauma were males, with male female ratio being 9:1.

Harde et al[54]. performed a research on thirty patients with acute chest injuries and found that out of thirty patients, twenty-three (76.7%) were younger than 45 years old, five (14.7%) were between 45 and 65 years old, and two (6.7%) were older than 65 years old. Patients hospitalised with isolated chest injuries had a mean SD age of 34.50 ± 15.861 years. 26 (86.7%) of the 30 patients were male, whereas 4 (13.3%) were female.

Gupta et al.[55] performed a research on 500 patients with chest damage and discovered that the majority (31%) were between the ages of 55 and 65, and the majority (64,2%) were male.

In a similar study done by Potey et al.[56] in 2020, out of 246 patients, 61 were between the ages of 31 and 40. This was the most common age range, making up 24.80% of the cases. The next most common age group was 21–30 years old, with 57 patients. The average median age was 38.56 years. Males made up 84.15% (207 cases), while females made up 15.85%. In this study, the male to female ratio was M:F=5.31:1.

The most commonly affected age group with blunt trauma chest belongs to young generation who often indulge in vehicular experimental activity (like over speeding etc) at the same time they comprise the important pillars of economy of country, thus increase in incidences will have great bearing in financial loss to the country. The large proportion of male involvement is attributed to occupational hazards and other socio-economical activities men are doing that predispose them to injuries. Males also represent the active group in any society that takes part in high-risk activities. The low incidence in females may be due to more confinement to domiciliary work, less outdoor activities, and less driving of vehicle as compared to males

**Mechanism of injury**

Almost 3/4$^{th}$ (73%) of the patients had suffered blunt chest trauma resulting from road side accident (RSA) followed by fall from height (9%),

assault (8%), animal hit (6%) and the least from sports (4%). The results were similar to the study conducted by Potey et al[56] who showed RTA to be the common cause of chest injury comprising of 71.14% of all other modes of injury. RTA was the most common cause in many other studies as well like Shah et al[57] (76%), Dangi et al[58] (80.9%), Dalal et al[59] (66.67%). Walia et al[51] in their study on 184 patients showed road traffic accidents ($n = 108$, 58.69%) to be the commonest cause. Assaults were the second most common mode of injury in their study ($n = 78$, 42.39%).

As per the National Health Portal, road traffic injuries lead to five million deaths annually around the world. In India, one million die each year and around 20 million are hospitalized due to injuries. In 2015, the National Crime Records Bureau (NCRB) reported 413,457 deaths in road traffic injuries[60].This may be explained by the fact that rise in number of RTA due to noncompliance to traffic rules by both driver as well as pedestrians, fatigue of the drivers, alcohol consumption during driving, lack of street lights, poor quality of roads, urbanization, population explosion, and tremendous growth in road transport sector.

Next common cause was fall from height contributing to 9% in a study by ponto et al 11.38% cases had FFH, and in a study by shah et al 16% cases had FFH. In present study 8% patients had injury due to assaults which was comparable to 11.79% in a study by Petro et al and 9.52% in a study by Dangi et al .

SIGN and SYMPTOMS

100% of the patients have chest pain while 58% have breathlessness. 12% patients presented with abdominal pain and distension. 17% patients were unable to move heir limb and 3% presented with cyanosis.

In a study by Sharma et al[61] similar findings were observed. Chest pain was the most common (100%) presenting symptom in this study followed by breathlessness (27.2%). Gregory PL et al also found that chest pain

was the most common complaint after chest injury and supports the current study.[62]

In present study A substantial majority of the patients (70%) suffered <=3 fractured ribs followed by patients with 4-6 fractured ribs (21%) and >6 fractured ribs (9%)

In a study by Potey et al[56] it was observed that rib fracture is the most common skeletal injury in the chest region i.e. 26.83%. This could be due to the fact that ribs are most exposed bone to trauma as they are spread over large area. Kumar et al[63], Shah et al[57], and Sharma et al[61] mentioned in their study that the commonest skeletal injury of thoracic region was fracture of ribs.

In a study by sharma et al[61] majority of patients sustained chest trauma up to chest wall and beyond that fracture ribs was the most common damage (355, 71%). Saaiq M et al[64] found that fracture ribs were most common chest injuries (74% patients) after chest wall tenderness and supports present study. Mohan Atri et al[65] also observed that rib fracture was the commonest injury (60%) . Gupta et al[55] in their study reported Rib fracture in 78% of patients. However the rate of rib fracture in present study was greater with all the patients presenting with rib fracture.

It has been reported by various studies that there is increase in complication rate with the greater number of rib fractures.[13,39,66]

Other then rib fracture we observed that majority of patients had pneumothorax 37% followed by lung laceration (21%), lung contusions(19%), haemothorax(12%), injury to tracheobronchial tree (4%) and flail chest and tensional pneumothorax seen in 3% each.

In a study by Potey et al[56] Lung contusion was the most common visceral injury encountered in 8.13% of cases whereas in study of Sharma et al it was 4% where as in present study it was seen in 19% cases.

In a study by Potey et al[56] Haemothorax was present in 7.32%, pneumothorax in 3.25%, while in study of Sharma et al it was 1.6% and 1.8% respectively.

In our study hemopneumothorax was present in 5% while in a study by Potey et al it was seen in 5.70% and in study of Shah et al similar incidence of hemopneumothorax was present i.e. 5%.[56, 57]

In a study by Walia et al[51] the most common injury reported was abrasion ($n = 76$). Serious injuries such as hemothorax ($n = 30$), pneumothorax ($n = 16$), and flail chest ($n = 8$) associated with it were comparatively less.

Choudhary et al. concluded in his study that most patients had soft-tissue injury and only intervention required in the study was intercoastal drainage[67].

In studies conducted by Kant et al[68] and Liman et al[13]., the most common injury in the chest was rib fractures and flail chest.

Ibrahim et al. reported open chest wall injuries as the most common presentation of chest injuries. The reason could be assaults contributing to the most common mode of injury[69].

Adegboye et al. in his study reported that blunt chest injuries lead to minor chest wall injuries (68%), major but stable chest wall injuries (7.6%), and flail chest injuries (10.8%). Thoracic injuries without fractures of bony chest wall occurred in 13.6% patients[70].

Lung is the most common organ involved due to its larger size and occupying major portion of thorax which make it is an easy target in chest injuries. This factor along with the higher incidence of ribs fracture causes increased risk of lung contusion, haemothorax, pneumothorax and hemopneumothorax. Difference in injuries sustained can be attributed to the mode of Injury and amount of energy transferred during injury.

In a study by Khursheed et al[5] rib fracture was the commonest type of chest injuries (78.12%) and out of the internal thoracic injuries lung was injured in a significant number of cases leading to only pneumothorax in 45%, hemothorax in 32.5%, hemopneumothorax in 23.75% and lung contusion in 18.75% was observed in close conformity with this study.

Atri *et al*.[65] studied 240 cases of chest trauma and observed that rib fracture present in 60% of cases. This is followed by surgical emphysema in 37% cases, hemopneumothorax in 27.1% cases, hemothorax in 21.7%, and lung contusion in 10% cases. Gupta et al[55], found that 78% of patients of chest trauma presented with a rib fracture. Surgical emphysema was present in 31% cases;
hemopneumothorax in 31.5% of cases and hemothorax in 25% of cases. In our study, isolated pneumothorax was seen in 8.5% of cases and lung contusion in 10% of patients with chest trauma. Flail chest was present in 7% of patients and diaphragmatic injury in 3% cases of trauma chest. Only one case of tracheobronchial injury was seen.
We did not report any case of cardiac, vascular, or esophageal injury in this study.

In tension pneumothorax, a one‑way communication occurs between the airway and pleural cavity. Air enters in the pleural cavity and progressively accumulates, causing compression of ipsilateral lung and displaces mediastinum to the opposite side. Helling *et al*. published that tension pneumothorax and cardiac tamponade are clinical diagnosis and should be managed aggressively without waiting for any prior investigation. In our study, we observed three cases of tension pneumothorax, which were managed by immediate chest drain however all cases of tensional pneumothorax passed away.[71]

ASSOCIATED INJURIES

In 47% patients head injury was present along with chest trauma and was the most common type of injury. Clavicular fracture with chest trauma was seen in 43% followed by limb fracture seen in 17%, abdominal injury seen in 12% and diaphragm injury (3%). Fracture scapula and sternum was seen in 2 and 1% patients respectively.

Our study was in accordance with the study conducted by Khursheed et al[5] . in their study Head and neck injuries(41.25%) were the most common associated injury in chest trauma victims, followed by musculoskeletal injury (23.12%), while only 5% of the patients had isolated chest trauma. Lema et al[72] reported 33.3% cases of head injury and 26.7% cases of musculoskeletal injuries in their study of 105 cases. Choudhary et al[67] reported 38.46% cases of head injury and 15.4 % cases of skeletal injuries in their study on 52 patients.

The associated injuries are related to the cause of injury as road traffic accidents always lead to multiple injuries whereas as assault lead to isolated injuries mostly.

Walia et al[51] showed that of 184 patients exclusive chest injuries were seen in less number of patients ($n = 57$). A majority of patients had associated head injuries ($n = 110$). Associated abdominal injuries were seen in 16 patients, while one patient had both abdominal and head injuries.

Potey et al[56] reported Head injury to be the most common associated injury in their study (25.20%), also present study was in accordance to that seen in study of Kulshrestha et al[73] (33%) and Shorr et al[20] (43%) who showed head injury to be the most common assoicted injury.

MANAGEMENT

57% patients were managed by intercostal tube drainage while 43% were managed conservatively. Tracheostomy was done in 1% cases. Patients with diaphragm injury underwent diaphragm repair(3% )and with abdominal injury underwent laparotomy(12%).

In a study by Gupta et al[55] 24% patients with chest trauma were treated conservatively, 72.5% required chest tube drainage. Three percent of patients with chest trauma required thoracotomy. Laparotomy was done in 6% patients due to abdominal and diaphragmatic injuries. This was in accordance to the present study .

Similar results were observed by Cakan *et al*.[74] in 2001, who reported that 41% of patients underwent tube thoracostomy alone while the majority of patients are treated conservatively, and only 3% required thoracotomy.

In a study by Walia et al[51] Most of the patients were managed conservatively (55.43%), and only 68 (39.69%) patients required chest tube drainage.

Kant et al. reported similar findings with 82% patients managed conservatively and 15% required chest tube drainage[68].

Kulshrestha et al. in their study concluded that most of chest trauma patients can be managed conservatively. In their study, only 18.32% patients required chest tube drainage and 2.6% required thoracotomy [73].

Liman reported that 25.7% patients required needle decompression out of which 2 patients required mediastinotomy. All patients of flail chest were managed in the intensive-care unit [13]. However, in study of Ibrahim et al., 58% patients required surgical interventions[69]. This could be due high number of open chest wall injuries.

Mortality

15% patients presented with shock and were managed accordingly while mortality in our series was 4%. Trauma leads to rib fracture and pain. It leads to increased mortality and morbidity. Severe pain disables patient's

quality of life. He is unable to breathe deeply and can't even cough normally as it causes pain. There is decrease in efforts of ventilation, can lead to pneumonia, atelectasis and ultimately respiratory failure. Patient spends more time in intensive care unit and is associated with increased mortality.[76]

The mortality rate in blunt thoracic trauma varies between 4% and 20%[77]. In a study by Walia et al Mortality was seen in 1.63% patients, while 79.35% ($n = 146$) were discharged in a satisfactory condition. The three patients who expired had other injuries also. Two patients were of road traffic injuries having head injury with multiple rib fractures, while one patient was of railway track injury having head injury, abdominal injury (liver laceration), and flail chest. Demirhan *et al*. observed that mortality rate was 6.8%, and the morbidity rate was 3.3% among chest trauma patients in his study. Similarly, a study by Gupta et al[55] the mortality rate was 7.5%. Most of them have multisystem injuries; head injury was the most common associated lethal injury.

REVISED TRAUMA SCORE

The Revised TS was generated by a combination of results from three categories: GCS, systolic blood pressure, and respiratory rate. Each parameter is assigned a coded value from 0 to 4 and the score range 0–12. Its parameters can easily be determined. Due to the severity of accidents, the majority of patients are associated with multiple traumas. It is needed to assess and predict the severity of trauma and determine the prognosis and death rates, possibility of survival, and rapid management in its treatment.[78]

We found that the total revised trauma score was 10.98±1.044. patients with >6 fractures have comparatively more (9±1.58) RTS then with 4-6(10.81±0.98) and 1-3(11.29±0.61) fractures. ($p<.001$). Thus we observed that with increasing severity of trauma RTS also increased.

Mansour *et al*. conducted a study among 200 trauma patients with objective to calculated and correlated RTS with injury severity and final outcome of the patients. The researchers stated that there was a remarkable correlation between mortality and RTS. Patients belonging to the RTS category 10 or less have a higher mortality rate.[79] Several other studies Bilgin *et al*[80]. and Yousefzadeh-Chabok *et al*[81]. showed the results equal to the present study. Table 4 reveals that the mean RTS score of the patients who survived was 11.898 ± 0.389, but patients who died showed a significantly lower RTS (8.842 ± 1.675) as compared to that among the survivors.[82] Rathore *et al*. reported a lower (4.59 ± 2.09) mean RTS comparable to ours among expired patients.[83]

We observed that there was significant difference in hospital stay(days) and no. of fractured ribs. The total hospital stay was 10.17±3.6. Patients with >6 fractures have comparatively more (18.44±4.66) hospital stay then with 4-6(10.95±2.22) and 1-3(8.87±2.02) fractures. (p<.001).

The median hospital length of stay of polytrauma patients with chest injuries was 11 days in a study by Chrysou, K et al.[84] liman et al[13] in their study observed Mean hospitalization time was 4.5 days. Mortality rate was 1% for the patients with blunt chest trauma, 4.7% in patients with more than two rib fractures and 17% for those with flail chest. Khursheed et showed The average duration of hospital stay to be 9.88 days. Novakov et al[85] reported a mean hospital stay duration of 8.7 days in a study on 212 patients of chest trauma. This was in accordance to present study . The duration of hospital stay depended on the severity of chest trauma as well as the associated injuries. Lin et al[86] in their study showed that The number of rib fractures was associated with prolonged hospital and intensive care unit (ICU) stays (≥7 days).

Thus in present study we conclude that RTAs are the most common cause of chest trauma. Male of productive age group (21–50 years) are most susceptible to trauma. Rib fracture is the most common injury in

chest trauma followed by pneumothorax and lung contusions. Themortality rate was 4% in our study. Majority of them are older patients and have multisystem injuries. Most patients can be treated ICD. Preventive measures aimed at educating the common masses about the traffic rules and regulations and strictly implementing them is indispensable to reduce the incidence of chest injuries. Thus, mortality can be decreased significantly, if patient reaches at tertiary center earliest and appropriate treatment started.

# SUMMARY AND CONCLUSION

The present prospective observational study was conducted in Dayanand Medical College the department surgery on patient with blunt chest trauma to evaluate the mechanism of injury, clinical presentation of blunt trauma chest, determine the associated injuries and to study the management and outcome. The results of the study are summarised below:

- The mean age of the patient was 41.52±7.7 years. 90 (90%) of the patients presenting blunt chest trauma were males, with male female ratio being 9:1.
- Almost 3/4$^{th}$ (73%) of the patients had suffered blunt chest trauma resulting from road side accident (RSA) followed by fall from height (9%), assault (8%), animal hit (6%) and the least from sports (4%).
- A substantial majority of the patients (70%) suffered <=3 fractured ribs followed by patients with 4-6 fractured ribs (21%) and >6 fractured ribs (9%)
- 100% of the patients have chest pain while 58% have breathlessness. 12% patients presented with abdominal pain and distension. 17% patients were unable to move heir limb and 3% presented with cyanosis.
- In 47% patients head injury was present along with chest trauma and was the most common type of injury. Clavicular fracture with chest trauma was seen in 43% followed by limb fracture seen in 17%, abdominal injury seen in 12% and diaphragm injury (3%). Fracture scapula and sternum was seen in 2 and 1% patients respectively.
- Majority of patients had pneumothorax 37% followed by lung laceration (21%), lung contusions(19%), hemothorax(12%), injury to tracheobronchial tree (4%) and flail chest and tensional pneumothorax seen in 3% each
- Blood transfusion was done in 28% patients.

- 57% patients were managed by intercostal tube drainage while 43% were managed conservatively. Tracheostomy was done in 1% cases. Patients with diaphragm injury underwent diaphragm repair(3% )and with abdominal injury underwent laparotomy(12%).
- 15% patients presented with shock and were managed accordingly while mortality in our series was 4%.
- The total revised trauma score was 10.98±1.044. patients with >6 fractures have comparatively more (9±1.58) RTS then with 4-6(10.81±0.98) and 1-3(11.29±0.61) fractures. (p<.001).
- We observed that there was significant difference in hospital stay(days) and no. of fractured ribs. The total hospital stay was 10.17±3.6. Patients with >6 fractures have comparatively more (18.44±4.66) hospital stay then with 4-6(10.95±2.22) and 1-3(8.87±2.02) fractures. (p<.001).
- We observed that there was no significant difference in age of the patients (years ) and no. of fractured ribs. However the age in patients with >6 fractures have comparatively more (49.44 ±20.57 years ) then with 4-6(42.29±17.93 years) and 1-3( 42.24 ± 13.57) fractures. (p >0.05).
- There was a moderate correlation between hospital stay and RTS i.e. -469. This signifies the weak negative correlation i.e. on increasing the age RTS moderately decreases.

**Conclusion**

Thus in present study we conclude that RTAs are the most common cause of chest trauma. Male of productive age group (21–50 years) are most susceptible to trauma. Rib fracture is the most common injury in chest trauma followed by pneumothorax and lung contusions. Themortality rate was 4% in our study. Majority of them are older patients and have multisystem injuries. Most patients can be treated ICD. Preventive measures aimed at educating the common masses about the traffic rules

and regulations and strictly implementing them is indispensable to reduce the incidence of chest injuries. Thus, mortality can be decreased significantly, if patient reaches at tertiary center earliest and appropriate treatment started.

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# PROFORMA

SERIAL NO:

NAME: AGE/SEX:

MRD.NO: Adm. NO:

DOA: DOD :

ADDRESS:

MECHANISM OF INJURY

TIME /DATE OF INJURY

PRESENT HISTORY LOC /HEADACHE/SEIZURE

CHEST PAIN/ BREATHLESSNESS/ HEMOPTYSIS



**Signature of Candidate** **Signature of Supervisor**

ABD PAIN /DISTENSION

INABILITY TO MOVE ANY LIMB

FIRST AID YES/NO

GENERAL EXAMINATION:-

GCS

PR

BP

RR

SPO2

PALLOR

CYANOSIS

TRACHEAL SHIFT

CHEST EXAMINATION



**Signature of Candidate** **Signature of Supervisor**

CVS/CNS/PA EXAMINATION

TYPE OF INJURY

1-BONY CAGE INJURIES

| | |
|---|---|
| A. SIMPLE RIB FRACTURE | YES/NO |
| B. MULTIPLE RIB FRACTURES | YES/NO |
| C. FLAIL CHEST | YES/NO |
| D. FRACTURE CLAVICLE | YES/NO |
| E. FRACTURE STERNUM | YES/NO |
| F. PNEUMOTHORAX | YES/NO |

2-PLEURAL SPACE INJURIES

| | |
|---|---|
| A.HEMOTHORAX | YES/NO |
| B.PNEUMOTHORAX | YES/NO |
| 1-TENSION PNEUMOTHORAX | YES/NO |
| 2-SUCKING CHEST WOUNDS | YES/NO |
| C.HEMOPNEUMOTHORAX | YES/NO |

3-INJURY TO THE LUNGS

| | |
|---|---|
| 1-PULMONARY CONTUSIONS | YES/NO |
| 2-LUNG LACERATION | YES/NO |
| 4-TRACHEO BRONCHIAL INJURIES | YES/NO |

5-ESOPHAGEAL INJURY YES/NO

6-INJURY TO DIAPHRAGM



**Signature of Candidate** **Signature of Supervisor**

PRESENTATION

ASSOCIATED INJURIES

1-HEAD YES/NO

2-FACE YES/NO

3-NECK YES/NO

4-ABDOMEN YES/NO

5-EXTREMITIES YES/NO

ROUTINE INVESTIGATIONS:

CXR

ECG

SPO2

OTHERS-USG CHEST

ECHOCARDIOGRAPHY

CT SCAN (HEAD/CHEST/ABDOMEN AND PELVIS)

MANAGEMENT:

1. O2 YES/NO

2. AMBUBAG VENTILATION YES/NO

3. TRACHEOSTOMY YES/NO

4. THORACOTOMY YES/NO

Indications of Thoracotomy

| | |
|---|---|
| Immediate Output | > 1.5 L in first Hour |
| Ongoing Output | > 200 cc/hr over next 2-4 hours |



**Signature of Candidate** **Signature of Supervisor**

INDICATION:

4-INTERCOSTAL TUBE DRAINAGE YES/NO

INDICATION

DAYS

5. I.V. FLUIDS

DAYS

6. BLOOD TRANSFUSION

BLOOD GROUP

7. SEDATION YES/NO

ANALGESICS YES/NO

MUSCLE RELAXANTS YES/NO

8-INTERCOSTAL NERVE BLOCKAGE YES/NO

REVISED TRAUMA SCORE

| PARAMETER | FINDINGS | POINTS |
|---|---|---|
| RESPIRATORY RATE | 10-29/ MINUTE | 4 |
| | >29/ MINUTE | 3 |
| | 6-9 / MINUTE | 2 |
| | 1-5 / MINUTE | 1 |
| | 0 | 0 |
| SYSTOLIC BLOOD PRESSURE | >89mm Hg | 4 |
| | 76-89mmHg | 3 |
| | 50-75mmHg | 2 |
| | 1-49mmHg | 1 |
| | 0 | 0 |
| Glasgow Coma Score | 13-15 | 4 |
| | 9-12 | 3 |
| | 6-8 | 2 |



**Signature of Candidate** **Signature of Supervisor**

| | | |
|---|---|---|
| | 4-5 | 1 |
| | 3 | 0 |

Revised trauma score-

= (points for respiratory rate) + (points for systolic blood pressure) + (points for Glasgow Coma Score)

Interpretation:

MAX SCORE -12

MIN SCORE -0

POTENTIALLY IMPORTANT TRAUMA OCCURS WITH SCORES <=11; THESE PATIENTS SHOULD BE TREATED AT A TRAUMA CENTRE



**Signature of Candidate** **Signature of Supervisor**

| sno. | name | mrd no | doa | age | sex | agegrp | MECHANISM OF INJURY | rib fracture | pnemothorax | hemothorax | hemopuneomothorax | lung ccontusion | lung laceration | injury to tracheobronheal tree | tensional pnuemothorax | management | C.FLAIL CHEST | D.FRACTURE CLAVICLE | E.FRACTURE STERNUM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | JS | 1460010 | 09-03-2021 | 30 | M | 2 | RSA | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| 2 | BS | 6452222 | 09-04-2021 | 18 | M | 1 | RSA | 2 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 0 |
| 3 | IS | 1410087 | 09-05-2021 | 18 | M | 1 | RSA | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 2 | 0 | 0 | 0 |
| 4 | RT | 1419997 | 10-03-2021 | 50 | M | 4 | RSA | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| 5 | HS | 1310001 | 14-03-2021 | 20 | M | 1 | RSA | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 2 | 0 | 1 | 0 |
| 6 | GS | 1122236 | 19-03-2021 | 50 | F | 4 | RSA | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 7 | RK | 1114448 | 24-03-2021 | 30 | M | 2 | RSA | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 8 | AC | 1114445 | 15-05-2021 | 45 | F | 4 | RSA | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 9 | AS | 1114457 | 16-06-2021 | 30 | M | 2 | RSA | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| 10 | SS | 1234567 | 17-06-2021 | 55 | M | 5 | RSA | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| 11 | RM | 1214870 | 19-06-2021 | 65 | M | 6 | RSA | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 2 | 0 | 0 | 0 |
| 12 | GS | 1216593 | 22-07-2021 | 22 | M | 2 | RSA | 2 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 0 |
| 13 | SK | 1418885 | 29-07-2021 | 44 | M | 4 | Assault | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| 14 | AS | 1314789 | 22-07-2021 | 35 | M | 3 | Assault | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| 15 | SKG | 1312224 | 28-07-2021 | 19 | M | 1 | RSA | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| 16 | IS | 1316667 | 11-08-2021 | 45 | M | 4 | RSA | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17 | SS | 1316635 | 14-08-2021 | 38 | M | 3 | hit by animal | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| 18 | BS | 1412224 | 19-08-2021 | 40 | M | 3 | RSA | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 19 | MK | 1312265 | 21-08-2021 | 36 | M | 3 | RSA | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| 20 | BS | 1412298 | 25-08-2021 | 55 | F | 5 | RSA | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 21 | PS | 1203336 | 05-09-2021 | 65 | M | 6 | hit by animal | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 22 | LM | 1205554 | 09-09-2021 | 60 | M | 5 | RSA | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| 23 | JH | 1204895 | 15-09-2021 | 35 | F | 3 | RSA | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 24 | HR | 1205637 | 17-09-2021 | 40 | M | 3 | RSA | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 25 | RD | 1196365 | 19-09-2021 | 62 | M | 6 | RSA | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 2 | 0 | 1 | 0 |
| 26 | PS | 1107458 | 23-09-2021 | 52 | M | 5 | RSA | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 27 | BS | 1214512 | 27-09-2021 | 42 | M | 4 | RSA | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 28 | TPS | 1413247 | 11-10-2021 | 55 | M | 5 | Assault | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| 29 | GR | 1213784 | 14-10-2021 | 39 | M | 3 | RSA | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 30 | DD | 1236548 | 19-10-2021 | 69 | M | 6 | RSA | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 31 | RS | 1419512 | 21-10-2021 | 50 | M | 4 | RSA | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 32 | DB | 1413572 | 25-10-2021 | 43 | M | 4 | RSA | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| 33 | DA | 1217382 | 27-10-2021 | 31 | M | 3 | RSA | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| 34 | HK | 1416325 | 06-11-2021 | 18 | M | 1 | sports | 3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| 35 | AG | 1419852 | 09-11-2021 | 45 | M | 4 | RSA | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 36 | GS | 1213345 | 11-11-2021 | 20 | M | 1 | RSA | 3 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 3 | 1 | 0 | 0 |
| 37 | AB | 1213697 | 13-11-2021 | 40 | M | 3 | RSA | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| 38 | IB | 1132564 | 18-11-2021 | 40 | M | 3 | hit by animal | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| 39 | TK | 1132478 | 20-11-2021 | 35 | M | 3 | RSA | 3 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 0 |
| 40 | MK | 1193214 | 22-11-2021 | 32 | M | 3 | RSA | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 41 | AN | 1214563 | 23-11-2021 | 35 | M | 3 | RSA | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 42 | JK | 1263547 | 25-11-2021 | 25 | F | 2 | RSA | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 43 | RS | 1103254 | 27-11-2021 | 22 | M | 2 | Assault | 2 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 0 |
| 44 | PK | 1103965 | 05-12-2021 | 69 | M | 6 | RSA | 3 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 3 | 1 | 0 | 0 |
| 45 | SR | 1103218 | 07-12-2021 | 60 | M | 5 | RSA | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |

| sno. | name | fracture scapula | head injury | limb injury | diagprahmatic injury | abdomen injury | CHEST PAIN | BREATHLESNESS | HEMOPTYSIS | abdomina pain | DISTENSION | INABILITY TO MOVE ANY LIMB | PALLOR | CYANOSIS | GCS | PR | BP systolic | BP diastolic | SPO2 | RR | RR | GCS | systolic BP | RTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | JS | 0 | 1 | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | | | 12 | 96 | 126 | 88 | 88 | 29 | 4 | 3 | 4 | 11 |
| 2 | BS | 0 | 1 | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | | | 9 | 102 | 88 | 55 | 91 | 34 | 3 | 3 | 3 | 9 |
| 3 | IS | 0 | 1 | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | | | 10 | 96 | 140 | 94 | 84 | 29 | 4 | 3 | 4 | 11 |
| 4 | RT | 0 | 0 | 1 | 0 | 0 | 1 | 1 | | 0 | 0 | 1 | | | 15 | 102 | 122 | 76 | 81 | 29 | 4 | 4 | 4 | 12 |
| 5 | HS | 0 | 1 | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | | | 11 | 102 | 158 | 94 | 85 | 29 | 4 | 3 | 4 | 11 |
| 6 | GS | 0 | 0 | 1 | 0 | 0 | 1 | 1 | | 0 | 0 | 1 | | | 15 | 100 | 130 | 74 | 89 | 12 | 4 | 4 | 4 | 12 |
| 7 | RK | 0 | 0 | 1 | 0 | 0 | 1 | 1 | | 0 | 0 | 1 | | | 15 | 92 | 150 | 94 | 98 | 28 | 4 | 4 | 4 | 12 |
| 8 | AC | 0 | 1 | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | | | 12 | 101 | 120 | 82 | 85 | 26 | 4 | 3 | 4 | 11 |
| 9 | AS | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | | | 15 | 95 | 140 | 94 | 98 | 15 | 4 | 4 | 4 | 12 |
| 10 | SS | 0 | 1 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | | | 11 | 101 | 130 | 70 | 100 | 16 | 4 | 3 | 4 | 11 |
| 11 | RM | 0 | 0 | 1 | 0 | 0 | 1 | 1 | | 0 | 0 | 1 | | | 15 | 101 | 87 | 53 | 89 | 31 | 3 | 4 | 3 | 10 |
| 12 | GS | 0 | 0 | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | | | 15 | 99 | 130 | 74 | 88 | 29 | 4 | 4 | 4 | 12 |
| 13 | SK | 1 | 0 | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | | | 15 | 87 | 130 | 74 | 81 | 30 | 3 | 4 | 4 | 11 |
| 14 | AS | 0 | 1 | 1 | 0 | 0 | 1 | 1 | | 0 | 0 | 1 | | | 9 | 94 | 123 | 88 | 88 | 28 | 4 | 3 | 4 | 11 |
| 15 | SKG | 0 | 0 | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | | | 15 | 94 | 137 | 94 | 88 | 32 | 3 | 4 | 4 | 11 |
| 16 | IS | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | | | 15 | 100 | 119 | 76 | 89 | 17 | 4 | 4 | 4 | 12 |
| 17 | SS | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | | | 15 | 98 | 155 | 94 | 99 | 19 | 4 | 4 | 4 | 12 |
| 18 | BS | 0 | 1 | 1 | 0 | 0 | 1 | 1 | | 0 | 0 | 1 | | | 10 | 86 | 147 | 94 | 87 | 28 | 4 | 3 | 4 | 11 |
| 19 | MK | 0 | 1 | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | | | 13 | 99 | 117 | 82 | 82 | 27 | 4 | 4 | 4 | 12 |
| 20 | BS | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | | | 15 | 97 | 137 | 94 | 98 | 13 | 4 | 4 | 4 | 12 |
| 21 | PS | 0 | 1 | 1 | 0 | 0 | 1 | 0 | | 0 | 0 | 1 | | | 12 | 93 | 127 | 70 | 100 | 12 | 4 | 3 | 4 | 11 |
| 22 | LM | 0 | 1 | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | | | 9 | 93 | 121 | 88 | 86 | 32 | 3 | 3 | 4 | 10 |
| 23 | JH | 0 | 0 | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | | | 15 | 97 | 135 | 94 | 83 | 28 | 4 | 4 | 4 | 12 |
| 24 | HR | 0 | 1 | 1 | 0 | 0 | 1 | 0 | | 0 | 0 | 1 | | | 11 | 98 | 117 | 76 | 89 | 11 | 4 | 3 | 4 | 11 |
| 25 | RD | 0 | 0 | 1 | 0 | 0 | 1 | 1 | | 0 | 0 | 1 | | | 15 | 97 | 153 | 94 | 81 | 29 | 4 | 4 | 4 | 12 |
| 26 | PS | 0 | 1 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | | | 11 | 94 | 145 | 94 | 98 | 13 | 4 | 3 | 4 | 11 |
| 27 | BS | 0 | 0 | 1 | 0 | 0 | 1 | 1 | | 0 | 0 | 1 | | | 15 | 93 | 115 | 82 | 95 | 29 | 4 | 4 | 4 | 12 |
| 28 | TPS | 0 | 1 | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | | | 9 | 99 | 135 | 94 | 98 | 27 | 4 | 3 | 4 | 11 |
| 29 | GR | 0 | 1 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | | | 10 | 91 | 125 | 70 | 100 | 13 | 4 | 3 | 4 | 11 |
| 30 | DD | 0 | 1 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | | | 10 | 90 | 118 | 88 | 98 | 14 | 4 | 3 | 4 | 11 |
| 31 | RS | 0 | 0 | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | | | 15 | 95 | 132 | 94 | 98 | 29 | 4 | 4 | 4 | 12 |
| 32 | DB | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | | | 15 | 97 | 114 | 76 | 89 | 15 | 4 | 4 | 4 | 12 |
| 33 | DA | 0 | 1 | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | | | 12 | 89 | 150 | 94 | 99 | 30 | 3 | 3 | 4 | 10 |
| 34 | HK | 0 | 0 | 0 | 0 | 1 | 1 | 1 | | 1 | 1 | 0 | | | 15 | 94 | 76 | 54 | 88 | 31 | 3 | 4 | 3 | 10 |
| 35 | AG | 0 | 1 | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | | | 12 | 99 | 112 | 82 | 95 | 32 | 3 | 3 | 4 | 10 |
| 36 | GS | 0 | 0 | 1 | 0 | 0 | 1 | 1 | | 0 | 0 | 1 | | | 15 | 88 | 152 | 94 | 86 | 33 | 3 | 4 | 4 | 11 |
| 37 | AB | 0 | 1 | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | | | 10 | 97 | 122 | 70 | 91 | 29 | 4 | 3 | 4 | 11 |
| 38 | IB | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | | | 15 | 81 | 122 | 91 | 100 | 13 | 4 | 4 | 4 | 12 |
| 39 | TK | 0 | 0 | 0 | 0 | 1 | 1 | 1 | | 1 | 1 | 0 | | | 15 | 97 | 81 | 61 | 76 | 30 | 3 | 4 | 0 | 7 |
| 40 | MK | 0 | 0 | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | | | 15 | 93 | 112 | 91 | 85 | 31 | 3 | 4 | 4 | 11 |
| 41 | AN | 0 | 1 | 1 | 0 | 0 | 1 | 0 | | 0 | 0 | 1 | | | 11 | 93 | 148 | 91 | 98 | 12 | 4 | 3 | 4 | 11 |
| 42 | JK | 0 | 1 | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | | | 9 | 97 | 140 | 89 | 91 | 15 | 4 | 3 | 4 | 11 |
| 43 | RS | 0 | 1 | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | | | 10 | 98 | 80 | 50 | 85 | 16 | 4 | 3 | 3 | 10 |
| 44 | PK | 0 | 0 | 1 | 0 | 1 | 1 | 1 | | 1 | 1 | 1 | | 1 | 15 | 97 | 80 | 50 | 80 | 34 | 3 | 4 | 3 | 10 |
| 45 | SR | 0 | 0 | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | | | 15 | 94 | 120 | 77 | 95 | 19 | 4 | 4 | 4 | 12 |

| sno. | name | mortality | complications | 0=oxygen,1=icd, 2=lap/diarepair+ICD, 3 only laprotomy or dia reapir | 1. O2 | 2. AMBUBAG VENTILATION | 3. TRACHEOSTOMY | other surgery | 4- INTERCOSTAL TUBE DRAINAGE | hospital stay | 6. BLOOD TRANSFUSION | 7. SEDATION | ANALGESICS | 8- INTERCOSTAL NERVE BLOCKAGE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | JS | | 0 | | | | | | 1 | 0 | | 0 | | 1 |
| 2 | BS | | 1 | | | | | | 1 | 0 | | 0 | | 1 |
| 3 | IS | | 0 | | | | | | 1 | 0 | | 0 | | 1 |
| 4 | RT | | 0 | | | | | | 1 | 0 | | 0 | | 1 |
| 5 | HS | | 0 | | | | | | 1 | 0 | | 0 | | 1 |
| 6 | GS | | 0 | | | | | | 0 | 1 | | 0 | | 0 |
| 7 | RK | | 0 | | | | | | 1 | 0 | | 0 | | 1 |
| 8 | AC | | 0 | | | | | | 1 | 0 | | 0 | | 1 |
| 9 | AS | | 0 | | | | | | 0 | 1 | | 0 | | 0 |
| 10 | SS | | 0 | | | | | | 0 | 1 | | 0 | | 0 |
| 11 | RM | | 1 | | | | | | 1 | 0 | | 0 | | 1 |
| 12 | GS | | 0 | | | | | | 1 | 0 | | 0 | | 1 |
| 13 | SK | | 0 | | | | | | 1 | 0 | | 0 | | 1 |
| 14 | AS | | 0 | | | | | | 1 | 0 | | 0 | | 1 |
| 15 | SKG | | 0 | | | | | | 1 | 0 | | 0 | | 1 |
| 16 | IS | | 0 | | | | | | 0 | 1 | | 0 | | 0 |
| 17 | SS | | 0 | | | | | | 0 | 1 | | 0 | | 0 |
| 18 | BS | | 0 | | | | | | 1 | 0 | | 0 | | 1 |
| 19 | MK | | 0 | | | | | | 1 | 0 | | 0 | | 1 |
| 20 | BS | | 0 | | | | | | 0 | 1 | | 0 | | 0 |
| 21 | PS | | 0 | | | | | | 0 | 1 | | 0 | | 0 |
| 22 | LM | | 0 | | | | | | 1 | 0 | | 0 | | 1 |
| 23 | JH | | 0 | | | | | | 1 | 0 | | 0 | | 1 |
| 24 | HR | | 0 | | | | | | 0 | 1 | | 0 | | 0 |
| 25 | RD | | 0 | | | | | | 1 | 0 | | 0 | | 1 |
| 26 | PS | | 0 | | | | | | 0 | 1 | | 0 | | 0 |
| 27 | BS | | 0 | | | | | | 1 | 0 | | 0 | | 1 |
| 28 | TPS | | 0 | | | | | | 1 | 0 | | 0 | | 1 |
| 29 | GR | | 0 | | | | | | 0 | 1 | | 0 | | 0 |
| 30 | DD | | 0 | | | | | | 0 | 1 | | 0 | | 0 |
| 31 | RS | | 0 | | | | | | 1 | 0 | | 0 | | 1 |
| 32 | DB | | 0 | | | | | | 0 | 1 | | 0 | | 0 |
| 33 | DA | | 0 | | | | | | 1 | 0 | | 0 | | 1 |
| 34 | HK | | 1 | | | | | | 2 | 0 | | 0 | laprotomy | 1 |
| 35 | AG | | 0 | | | | | | 1 | 0 | | 0 | | 1 |
| 36 | GS | | 0 | | | | | | 1 | 0 | | 1 | | 1 |
| 37 | AB | | 0 | | | | | | 1 | 0 | | 0 | | 1 |
| 38 | IB | | 0 | | | | | | 0 | 1 | | 0 | | 0 |
| 39 | TK | | 1 | | | | | | 2 | 0 | | 0 | laprotomy | 1 |
| 40 | MK | | 0 | | | | | | 1 | 0 | | 0 | | 1 |
| 41 | AN | | 0 | | | | | | 0 | 1 | | 0 | | 0 |
| 42 | JK | | 0 | | | | | | 1 | 0 | | 0 | | 1 |
| 43 | RS | | 1 | | | | | | 1 | 0 | | 0 | | 1 |
| 44 | PK | 1 | 1 | | | | | | 2 | 0 | | 0 | laprotomy | 1 |
| 45 | SR | | 0 | | | | | | 1 | 0 | | 0 | | 1 |

| sno. | name | mrd no | doa | age | sex | agegrp | MECHANISM OF INJURY | rib fracture | pnemothorax | hemothorax | hemopuneomothorax | lung ccontusion | lung laceration | injury to tracheobronheal tree | tensional pnuemothorax | management | C.FLAIL CHEST | D.FRACTURE CLAVICLE | E.FRACTURE STERNUM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 46 | SK | 1109874 | 09-12-2021 | 20 | M | 1 | sports | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 47 | RR | 1104826 | 11-12-2021 | 52 | M | 5 | RSA | 3 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 0 |
| 48 | RK | 1103791 | 13-12-2021 | 67 | M | 6 | RSA | 3 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 3 | 1 | 0 | 0 |
| 49 | RB | 1104682 | 15-12-2021 | 60 | M | 5 | RSA | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 50 | BS | 1411119 | 17-12-2021 | 21 | M | 2 | RSA | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 51 | SM | 1413698 | 18-12-2021 | 35 | M | 3 | RSA | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| 52 | MA | 1214563 | 19-12-2021 | 23 | M | 2 | RSA | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| 53 | MM | 1217954 | 20-12-2021 | 23 | M | 2 | RSA | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 54 | RS | 1216352 | 22-12-2021 | 55 | M | 5 | RSA | 2 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 0 |
| 55 | SS | 1149998 | 24-12-2021 | 25 | M | 2 | RSA | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 56 | DS | 1112287 | 26-12-2021 | 55 | F | 5 | FFH | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| 57 | GS | 1214563 | 28-12-2021 | 35 | M | 3 | RSA | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 58 | HS | 1100005 | 30-12-2021 | 50 | F | 4 | RSA | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 59 | PP | 1120008 | 01-01-2022 | 35 | M | 3 | RSA | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 60 | HM | 1134448 | 03-01-2022 | 60 | M | 5 | RSA | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 61 | RM | 1109750 | 05-01-2022 | 70 | M | 6 | RSA | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 62 | CK | 1148050 | 08-01-2022 | 27 | M | 2 | RSA | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 2 | 0 | 1 | 0 |
| 63 | CS | 1314502 | 14-01-2022 | 49 | M | 4 | Assault | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 64 | VA | 1024015 | 17-01-2022 | 40 | M | 3 | Assault | 2 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 0 |
| 65 | FG | 1102002 | 19-01-2022 | 20 | M | 1 | RSA | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| 66 | HG | 1403124 | 21-01-2022 | 50 | M | 4 | RSA | 3 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 2 | 0 | 1 | 0 |
| 67 | JJ | 1123045 | 23-01-2022 | 43 | M | 4 | hit by animal | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 68 | KL | 1143245 | 25-01-2022 | 69 | M | 6 | RSA | 3 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 3 | 1 | 0 | 1 |
| 69 | JH | 1310004 | 01-02-2022 | 41 | M | 4 | RSA | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| 70 | CV | 1310045 | 03-02-2022 | 60 | F | 5 | RSA | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 71 | BN | 1023658 | 06-02-2022 | 70 | M | 6 | hit by animal | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| 72 | BB | 1024568 | 08-02-2022 | 65 | M | 6 | RSA | 3 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 3 | 0 | 1 | 0 |
| 73 | NN | 1034971 | 10-02-2022 | 40 | F | 3 | FFH | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 74 | ML | 1013654 | 12-02-2022 | 45 | M | 4 | FFH | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 75 | KJ | 1418549 | 16-02-2022 | 67 | M | 6 | FFH | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 2 | 0 | 1 | 0 |
| 76 | DS | 1014587 | 18-02-2022 | 57 | M | 5 | RSA | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 77 | CS | 1410770 | 20-02-2022 | 47 | M | 4 | RSA | 2 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| 78 | VS | 1413636 | 22-02-2022 | 60 | M | 5 | Assault | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 79 | BS | 1203333 | 24-02-2022 | 44 | M | 4 | FFH | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 80 | UK | 1219870 | 26-02-2022 | 42 | M | 4 | RSA | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 81 | RK | 1249720 | 03-03-2022 | 55 | M | 5 | RSA | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 82 | NK | 1410087 | 05-03-2022 | 21 | M | 2 | RSA | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 83 | PS | 1413030 | 08-03-2022 | 53 | M | 5 | FFH | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 84 | AS | 1425896 | 11-04-2022 | 23 | M | 2 | sports | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 85 | GLS | 1120320 | 14-04-2022 | 50 | M | 4 | RSA | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 86 | HPS | 1240365 | 16-04-2022 | 25 | M | 2 | FFH | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |

| sno. | name | fracture scapula | head injury | limb injury | diagprahmatic injury | abdomen injury | CHEST PAIN | BREATHLESNESS | HEMOPTYSIS | abdomina pain | DISTENSION | INABILITY TO MOVE ANY LIMB | PALLOR | CYANOSIS | GCS | PR | BP systolic | BP diastolic | SPO2 | RR | RR | GCS | systolic BP | RTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 46 | SK | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | | | 15 | 93 | 113 | 90 | 98 | 13 | 4 | 4 | 4 | 12 |
| 47 | RR | 0 | 0 | 0 | 0 | 1 | 1 | 1 | | 1 | 1 | 0 | | | 15 | 99 | 81 | 51 | 80 | 35 | 3 | 4 | 0 | 7 |
| 48 | RK | 0 | 0 | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | | 1 | 15 | 91 | 83 | 54 | 81 | 32 | 3 | 4 | 3 | 10 |
| 49 | RB | 0 | 1 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | | | 12 | 90 | 107 | 90 | 98 | 13 | 4 | 3 | 4 | 11 |
| 50 | BS | 0 | 1 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | | | 9 | 95 | 117 | 88 | 98 | 13 | 4 | 3 | 4 | 11 |
| 51 | SM | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | | | 15 | 97 | 153 | 82 | 89 | 14 | 4 | 4 | 4 | 12 |
| 52 | MA | 0 | 0 | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | | | 15 | 97 | 145 | 76 | 84 | 15 | 4 | 4 | 4 | 12 |
| 53 | MM | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | | | 15 | 94 | 115 | 76 | 98 | 13 | 4 | 4 | 4 | 12 |
| 54 | RS | 0 | 1 | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | | | 11 | 93 | 83 | 54 | 85 | 30 | 3 | 3 | 3 | 9 |
| 55 | SS | 0 | 1 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | | | 11 | 99 | 125 | 89 | 98 | 12 | 4 | 3 | 4 | 11 |
| 56 | DS | 0 | 1 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | | | 9 | 91 | 118 | 87 | 100 | 15 | 4 | 3 | 4 | 11 |
| 57 | GS | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | | | 15 | 90 | 132 | 81 | 98 | 16 | 4 | 4 | 4 | 12 |
| 58 | HS | 0 | 1 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | | | 10 | 95 | 114 | 83 | 98 | 17 | 4 | 3 | 4 | 11 |
| 59 | PP | 0 | 1 | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | | | 13 | 97 | 112 | 91 | 87 | 19 | 4 | 4 | 4 | 12 |
| 60 | HM | 0 | 1 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | | | 12 | 89 | 122 | 85 | 95 | 13 | 4 | 3 | 4 | 11 |
| 61 | RM | 0 | 1 | 1 | 0 | 0 | 1 | 1 | | 0 | 0 | 1 | | | 9 | 94 | 87 | 56 | 85 | 12 | 4 | 3 | 3 | 10 |
| 62 | CK | 0 | 0 | 1 | 0 | 0 | 1 | 1 | | 0 | 0 | 1 | | | 15 | 99 | 84 | 55 | 82 | 11 | 4 | 4 | 3 | 11 |
| 63 | CS | 0 | 1 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | | | 11 | 88 | 153 | 89 | 90 | 13 | 4 | 3 | 4 | 11 |
| 64 | VA | 1 | 1 | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | | | 12 | 97 | 84 | 60 | 85 | 13 | 4 | 3 | 3 | 10 |
| 65 | FG | 0 | 0 | 1 | 0 | 0 | 1 | 1 | | 0 | 0 | 1 | | | 15 | 80 | 115 | 77 | 90 | 14 | 4 | 4 | 4 | 12 |
| 66 | HG | 0 | 0 | 1 | 0 | 1 | 1 | 1 | | 1 | 1 | 1 | | | 15 | 99 | 72 | 49 | 94 | 32 | 3 | 4 | 2 | 9 |
| 67 | JJ | 0 | 0 | 0 | 1 | 1 | 1 | 0 | | 1 | 1 | 0 | | | 15 | 84 | 125 | 90 | 93 | 13 | 4 | 4 | 4 | 12 |
| 68 | KL | 0 | 0 | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | | 1 | 15 | 110 | 84 | 64 | 78 | 35 | 3 | 4 | 3 | 10 |
| 69 | JH | 0 | 1 | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | | | 10 | 107 | 132 | 90 | 90 | 30 | 3 | 3 | 4 | 10 |
| 70 | CV | 0 | 1 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | | | 13 | 109 | 114 | 90 | 94 | 31 | 3 | 4 | 4 | 11 |
| 71 | BN | 0 | 0 | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | | | 15 | 93 | 112 | 88 | 90 | 32 | 3 | 4 | 4 | 11 |
| 72 | BB | 0 | 0 | 0 | 0 | 1 | 1 | 1 | | 1 | 1 | 0 | | | 15 | 99 | 81 | 61 | 93 | 33 | 3 | 4 | 0 | 7 |
| 73 | NN | 0 | 1 | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | | | 12 | 91 | 122 | 76 | 92 | 29 | 4 | 3 | 4 | 11 |
| 74 | ML | 0 | 0 | 0 | 0 | 1 | 1 | 0 | | 1 | 1 | 0 | | | 15 | 90 | 117 | 76 | 86 | 30 | 3 | 4 | 4 | 11 |
| 75 | KJ | 0 | 1 | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | | | 10 | 95 | 153 | 76 | 93 | 31 | 3 | 3 | 4 | 10 |
| 76 | DS | 0 | 1 | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | | | 11 | 97 | 145 | 89 | 85 | 28 | 4 | 3 | 4 | 11 |
| 77 | CS | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | | | 15 | 89 | 115 | 87 | 94 | 29 | 4 | 4 | 4 | 12 |
| 78 | VS | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | | | 15 | 94 | 125 | 81 | 86 | 29 | 4 | 4 | 4 | 12 |
| 79 | BS | 0 | 1 | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | | | 11 | 99 | 118 | 83 | 90 | 27 | 4 | 3 | 4 | 11 |
| 80 | UK | 0 | 1 | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | | | 9 | 88 | 132 | 88 | 89 | 35 | 3 | 3 | 4 | 10 |
| 81 | RK | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | | | 15 | 97 | 114 | 86 | 90 | 30 | 3 | 4 | 4 | 11 |
| 82 | NK | 0 | 1 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | | | 10 | 86 | 112 | 80 | 94 | 31 | 3 | 3 | 4 | 10 |
| 83 | PS | 0 | 1 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | | | 13 | 80 | 122 | 74 | 93 | 32 | 3 | 4 | 4 | 11 |
| 84 | AS | 0 | 0 | 0 | 0 | 1 | 1 | 0 | | 1 | 1 | 0 | | | 15 | 74 | 153 | 74 | 90 | 33 | 3 | 4 | 4 | 11 |
| 85 | GLS | 0 | 1 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | | | 12 | 74 | 125 | 87 | 90 | 29 | 4 | 3 | 4 | 11 |
| 86 | HPS | 0 | 1 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | | | 9 | 87 | 117 | 81 | 94 | 30 | 3 | 3 | 4 | 10 |

| sno. | name | mortality | complications | 0=oxygen,1=icd, 2=lap/diarepair+ICD, 3 only laprotomy or dia reapir | 1. O2 | 2. AMBUBAG VENTILATION | 3. TRACHEOSTOMY | other surgery | 4- INTERCOSTAL TUBE DRAINAGE | hospital stay | 6. BLOOD TRANSFUSION | 7. SEDATION | ANALGESICS | 8- INTERCOSTAL NERVE BLOCKAGE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 46 | SK | | 0 | | | | | | 0 | 1 | | 0 | | 0 |
| 47 | RR | | 1 | | | | | | 2 | 0 | | 0 | laprotomy | 1 |
| 48 | RK | 1 | 1 | | | | | | 1 | 0 | | 0 | | 1 |
| 49 | RB | | 0 | | | | | | 0 | 1 | | 0 | | 0 |
| 50 | BS | | 0 | | | | | | 0 | 1 | | 0 | | 0 |
| 51 | SM | | 0 | | | | | | 0 | 1 | | 0 | | 0 |
| 52 | MA | | 0 | | | | | | 1 | 0 | | 0 | | 1 |
| 53 | MM | | 0 | | | | | | 0 | 1 | | 0 | | 0 |
| 54 | RS | | 1 | | | | | | 1 | 0 | | 0 | | 1 |
| 55 | SS | | 0 | | | | | | 0 | 1 | | 0 | | 0 |
| 56 | DS | | 0 | | | | | | 0 | 1 | | 0 | | 0 |
| 57 | GS | | 0 | | | | | | 0 | 1 | | 0 | | 0 |
| 58 | HS | | 0 | | | | | | 0 | 1 | | 0 | | 0 |
| 59 | PP | | 0 | | | | | | 1 | 0 | | 0 | | 1 |
| 60 | HM | | 0 | | | | | | 0 | 1 | | 0 | | 0 |
| 61 | RM | | 1 | | | | | | 1 | 0 | | 0 | | 1 |
| 62 | CK | | 1 | | | | | | 1 | 0 | | 0 | | 1 |
| 63 | CS | | 0 | | | | | | 0 | 1 | | 0 | | 0 |
| 64 | VA | | 1 | | | | | | 1 | 0 | | 0 | | 1 |
| 65 | FG | | 0 | | | | | | 1 | 0 | | 0 | | 1 |
| 66 | HG | 1 | 1 | | | | | | 2 | 0 | | 0 | laprotomy | 1 |
| 67 | JJ | | 0 | | | | | | 3 | 1 | | 0 | diagphram repair with laprotomy | 0 |
| 68 | KL | 1 | 1 | | | | | | 1 | 0 | | 0 | | 1 |
| 69 | JH | | 0 | | | | | | 1 | 0 | | 0 | | 1 |
| 70 | CV | | 0 | | | | | | 0 | 1 | | 0 | | 0 |
| 71 | BN | | 0 | | | | | | 1 | 0 | | 0 | | 1 |
| 72 | BB | | 1 | | | | | | 2 | 0 | | 0 | laprotomy | 1 |
| 73 | NN | | 0 | | | | | | 1 | 0 | | 0 | | 1 |
| 74 | ML | | 0 | | | | | | 3 | 1 | | 0 | laprotomy | 0 |
| 75 | KJ | | 0 | | | | | | 1 | 0 | | 0 | | 1 |
| 76 | DS | | 0 | | | | | | 1 | 0 | | 0 | | 1 |
| 77 | CS | | 0 | | | | | | 0 | 1 | | 0 | | 0 |
| 78 | VS | | 0 | | | | | | 0 | 1 | | 0 | | 0 |
| 79 | BS | | 0 | | | | | | 1 | 0 | | 0 | | 1 |
| 80 | UK | | 0 | | | | | | 1 | 0 | | 0 | | 1 |
| 81 | RK | | 0 | | | | | | 0 | 1 | | 0 | | 0 |
| 82 | NK | | 0 | | | | | | 0 | 1 | | 0 | | 0 |
| 83 | PS | | 0 | | | | | | 0 | 1 | | 0 | | 0 |
| 84 | AS | | 0 | | | | | | 3 | 1 | | 0 | laprotomy | 0 |
| 85 | GLS | | 0 | | | | | | 0 | 1 | | 0 | | 0 |
| 86 | HPS | | 0 | | | | | | 0 | 1 | | 0 | | 0 |

| sno. | name | mrd no | doa | age | sex | agegrp | MECHANISM OF INJURY | rib fracture | pnemothorax | hemothorax | hemopuneomothorax | lung ccontusion | lung laceration | injury to tracheobronheal tree | tensional pnuemothorax | management | C.FLAIL CHEST | D.FRACTURE CLAVICLE | E.FRACTURE STERNUM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 87 | AS | 1410236 | 18-04-2022 | 45 | M | 4 | RSA | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 88 | AKS | 1410000 | 20-04-2022 | 45 | M | 4 | hit by animal | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 89 | PM | 1410008 | 22-04-2022 | 40 | M | 3 | FFH | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 90 | PM | 1413652 | 24-04-2022 | 37 | M | 3 | RSA | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 91 | HSS | 1313625 | 26-04-2022 | 40 | M | 3 | RSA | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 92 | JSS | 1410978 | 28-04-2022 | 30 | F | 2 | RSA | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 93 | AS | 1413650 | 02-05-2022 | 27 | M | 2 | Assault | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| 94 | PK | 1427895 | 04-05-2022 | 55 | M | 5 | RSA | 2 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95 | PS | 1213020 | 06-05-2022 | 65 | M | 6 | RSA | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 96 | MS | 1512050 | 06-06-2022 | 25 | M | 2 | sports | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 97 | PP | 1423084 | 14-06-2022 | 57 | M | 5 | RSA | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 98 | MS | 1472589 | 18-06-2022 | 55 | M | 5 | RSA | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 99 | BS | 1237890 | 20-06-2022 | 65 | M | 6 | FFH | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| 100 | NS | 1023021 | 14-07-2022 | 26 | M | 2 | RSA | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |

| sno. | name | fracture scapula | head injury | limb injury | diagprahmatic injury | abdomen injury | CHEST PAIN | BREATHLESNESS | HEMOPTYSIS | abdomina pain | DISTENSION | INABILITY TO MOVE ANY LIMB | PALLOR | CYANOSIS | GCS | PR | BP systolic | BP diastolic | SPO2 | RR | RR | GCS | systolic BP | RTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 87 | AS | 0 | 0 | 0 | 1 | 1 | 1 | 0 | | 1 | 1 | 0 | | | 15 | 81 | 153 | 87 | 90 | 31 | 3 | 4 | 4 | 11 |
| 88 | AKS | 0 | 0 | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | | | 15 | 87 | 145 | 87 | 93 | 29 | 4 | 4 | 4 | 12 |
| 89 | PM | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | | | 15 | 87 | 115 | 88 | 92 | 28 | 4 | 4 | 4 | 12 |
| 90 | PM | 0 | 0 | 0 | 1 | 1 | 1 | 0 | | 1 | 1 | 0 | | | 15 | 85 | 125 | 88 | 86 | 29 | 4 | 4 | 4 | 12 |
| 91 | HSS | 0 | 1 | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | | | 11 | 79 | 118 | 88 | 93 | 28 | 4 | 3 | 4 | 11 |
| 92 | JSS | 0 | 0 | 0 | 0 | 1 | 1 | 0 | | 1 | 1 | 0 | | | 15 | 73 | 132 | 88 | 92 | 29 | 4 | 4 | 4 | 12 |
| 93 | AS | 0 | 0 | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | | | 15 | 84 | 114 | 74 | 93 | 29 | 4 | 4 | 4 | 12 |
| 94 | PK | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | | | 15 | 89 | 112 | 87 | 94 | 30 | 3 | 4 | 4 | 11 |
| 95 | PS | 0 | 0 | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | | | 15 | 89 | 122 | 88 | 86 | 32 | 3 | 4 | 4 | 11 |
| 96 | MS | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | | | 15 | 80 | 153 | 88 | 90 | 33 | 3 | 4 | 4 | 11 |
| 97 | PP | 0 | 1 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | | | 12 | 85 | 125 | 88 | 89 | 29 | 4 | 3 | 4 | 11 |
| 98 | MS | 0 | 0 | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | | | 15 | 78 | 125 | 88 | 90 | 31 | 3 | 4 | 4 | 11 |
| 99 | BS | 0 | 0 | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | | | 15 | 87 | 145 | 88 | 94 | 28 | 4 | 4 | 4 | 12 |
| 100 | NS | 0 | 1 | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 0 | | | 11 | 84 | 130 | 87 | 93 | 27 | 4 | 3 | 4 | 11 |

| sno. | name | mortality | complications | 0=oxygen,1=icd, 2=lap/diarepair+ICD, 3 only laprotomy or dia reapir | 1. O2 | 2. AMBUBAG VENTILATION | 3. TRACHEOSTOMY | other surgery | 4- INTERCOSTAL TUBE DRAINAGE | hospital stay | 6. BLOOD TRANSFUSION | 7. SEDATION | ANALGESICS | 8- INTERCOSTAL NERVE BLOCKAGE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 87 | AS | | 0 | | | | | | 3 | 1 | | 0 | diagphram repair with laprotomy | 0 |
| 88 | AKS | | 0 | | | | | | 1 | 0 | | 0 | | 1 |
| 89 | PM | | 0 | | | | | | 0 | 1 | | 0 | | 0 |
| 90 | PM | | 0 | | | | | | 3 | 1 | | 0 | diagphram repair with laprotomy | 0 |
| 91 | HSS | | 0 | | | | | | 1 | 0 | | 0 | | 1 |
| 92 | JSS | | 0 | | | | | | 3 | 1 | | 0 | laprotomy | 0 |
| 93 | AS | | 0 | | | | | | 1 | 0 | | 0 | | 1 |
| 94 | PK | | 0 | | | | | | 0 | 1 | | 0 | | 0 |
| 95 | PS | | 0 | | | | | | 1 | 0 | | 0 | | 1 |
| 96 | MS | | 0 | | | | | | 0 | 1 | | 0 | | 0 |
| 97 | PP | | 0 | | | | | | 0 | 1 | | 0 | | 0 |
| 98 | MS | | 0 | | | | | | 1 | 0 | | 0 | | 1 |
| 99 | BS | | 0 | | | | | | 1 | 0 | | 0 | | 1 |
| 100 | NS | | 0 | | | | | | 1 | 0 | | 0 | | 1 |

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No. BFUHS/2K21p-TH/ 129

Date 05/11/21

The Principal,
DMC, Ludhiana.

**Subject:** Approval of Plan of Thesis.

This is to inform you that the Faculty of Medical Sciences in its meeting held on 29.10.2021 has approved the plan of thesis of **Harnarinder Singh,** a student of your college for **MS General Surgery** along with the names of Supervisor/Co-Supervisor as under:-

Topic Plan of Thesis
To study clinical profile and outcome of blunt trauma chest.

**Supervisor**
Dr. Varun Gupta
Assoc. Prof.,
Dept. of Surgery,
DMCH, Ludhiana.

**Co-Supervisor**

Dr. P. S. Nain
Prof.,
Dept. of Surgery,
DMCH, Ludhiana.

The student has to submit the four copies of thesis (along with PDF format) , to the Controller of Examinations, BFUHS, Faridkot, at least six months before the commencement of theory examination, if he/she is otherwise eligible to take the examination. He /She must directed to attach a photocopy of this letter with the forwarding letter while submitting thesis to the University along with the letter of approval of University for change of supervisor/Co-Supervisor, change of topic,( if any).

Dr. S P Singh MS(Oph)
Controller of Examinations

*Note :*

*129. If any discrepancy found regarding topic of thesis or Supervisor/Co-Supervisor, inform undersigned within one month after issue of this letter.*

*130. The student may submit the thesis as per the schedule already conveyed i.e for May/June examination 30th Nov of the preceding the year of examination and for Nov/Dec examinations 31st May of the year of examination.*

4/05-2020

# TO STUDY CLINICAL PROFILE AND OUTCOME OF BLUNT TRAUMA CHEST

**THESIS PROPOSAL**

**FOR APPROVAL OF SUBJECT OF THESIS TO BE SUBMITTED**
**IN PARTIAL FULFILMENT OF THE REQUIREMENTS**
**FOR THE DEGREE OF**

**Master of Surgery**

**In**

**GENERAL SURGERY**

**OF THE**

**BABA FARID UNIVERSITY OF HEALTH SCIENCES**

**FARIDKOT**

**March 2021**

**DR. HARNARINDER SINGH**

**DEPARTMENT OF GENERAL SURGERY**
**DAYANAND MEDICAL COLLEGE & HOSPITAL, LUDHIANA**
**LUDHIANA, PUNJAB-141001**

# ABSTRACT OF PLAN OF THESIS

| | |
|---|---|
| Title | TO STUDY CLINICAL PROFILE AND OUTCOME OF BLUNT TRAUMA CHEST |
| For the degree of | M.S. General Surgery |
| Name of the candidate | Dr.Harnarinder Singh |
| Supervisor | Dr. Varun Gupta, Associate Professor, Department of Surgery, DMCH, Ludhiana |
| Co-supervisor | Dr. P. S. Nain, Professor, Department of Surgery, DMCH, Ludhiana |
| Institution | Dayanand Medical College & Hospital, Ludhiana |
| University | Baba Farid University of Health Sciences, Faridkot |

**Introduction:** Blunt Trauma to the chest is very common occurrence in setting of traumatic incidents occurring with highest frequency in young adults between 15-35 years of age .Traumatic chest injuries lead to significant burden of mortality and morbidity in the young population

**Aim of Study:-** To study clinical profile and outcome of blunt trauma chest.

**Materials & methods:** This study will be conducted in DMCH Ludhiana. The study will include patients presenting to DMCH from 1st March 2021 to 31st August 2022 with blunt trauma chest and hospital course of such patients will be traced.

**INCLUSION CRITERIA-** All the patients of polytrauma requiring admission.

**EXCLUSION CRITERIA :–**

1-Patients below 18 years and above 70 years of age of either gender.

2-Severly traumatized patients who expired before they could be evaluated for chest trauma

3-Penetrating Thoracic Injuries

**Clinical Significance**: Early management to decrease morbidity and mortality in blunt trauma chest patients.

**Keywords:** Blunt trauma, Penetrating thoracic injuries, thoracic trauma, thoracotomy

| (Signature) | (Signature) | (Signature) | (Signature) |
|---|---|---|---|
| Candidate | Co-supervisor | Supervisor | Principal |

## CERTIFICATE OF FACILITIES AVAILABLE

This is to certify that the facilities for work on the subject of thesis titled **"TO STUDY CLINICAL PROFILE AND OUTCOME OF BLUNT TRAUMA CHEST"** exist in the Department of Surgery, DMC&H, Ludhiana and will be provided to the candidate. We will see that the data being included in the thesis is genuine and is collected by the candidate herself under our supervision and guidance.

**Supervisor**

**Dr. Varun Gupta**
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**Co-Supervisor**

**Dr. P S Nain**
Professor
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**Head of the Department**

**Dr. Jaspal Singh**
Professor & Head
Department of General Surgery
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Place : _____

Date : _____

# APPROVAL PROFORMA
# BY
# RESEARCH & ETHICAL COMMITTEE
# DAYANAND MEDICAL COLLEGE & HOSPITAL, LUDHIANA

| | |
|---|---|
| **Name of candidate** | Dr. Harnarinder Singh |
| **Department** | General Surgery |
| **Topic of Thesis** | TO STUDY CLINICAL PROFILE AND OUTCOME OF BLUNT TRAUMA CHEST |
| **Likely date of appearing in PG examination** | MAY 2023 |
| **Date of enrollment** | 26th July, 2020 |
| **Name of Head of Department** | Dr. Jaspal Singh |
| 1) **Supervisor**<br>2) **Co-Supervisor** | Dr. Varun Gupta<br>Dr. P. S. Nain |
| **Signature of Members of Research Committee with Stamp** | **Signature of Members of Ethics Committee with Stamp** |
| Dr. Harpreet Kaur (Professor & Head, Pathology) | Mr. R K Sharma (Legal Expert) |
| Dr. Jaspal Singh (Professor & Head, Surgery) | Dr. Ramit Mahajan (Associate Professor, Gastroenterology) |
| Dr. Dinesh Gupta (Professor & Head, Medicine) | Dr. Anu Sharma (Professor, Anatomy) |
| Dr. Sandeep Kaushal (Dean Academics & Professor & Head, Pharmacology) | Dr. Sandeep Kaushal (Dean Academics & Professor & Head, Pharmacology) |
| Dr. Gurpreet S Wander (Vice Principal) | Dr. Gurpreet S Wander (Vice Principal & Professor & Head, Cardiology) |
| | Dr. Gagandeep Singh (Secretary, Ethics Committee Professor & Head, Neurology) |

**Approved: Yes / No**

**Dr. Sandeep Puri**
**Chairperson**
**Research Committee**

**Approved: Yes / ~~No~~**

**Prof. Arvind Malhotra**
**Chairman**
**Ethics Committee**

# BABA FARID UNIVERSITY OF HEALTH SCIENCES, FARIDKOT

## PROFORMA FOR REGISTRATION OF SUBJECT FOR DISSERTATION

| | | |
|---|---|---|
| 1 | NAME OF THE CANDIDATE AND ADDRESS | Dr. Harnarinder Singh<br>Sikh line, lane no 2, behind mini secretariat hoshiarpur-146001 |
| 2 | NAME OF THE INSTITUTE | Dayanand medical college Ludhiana |
| 3 | COURSE OF STUDY AND SUBJECT | MS GENERAL SURGERY |
| 4 | DATE OF ADMISSION OF COURSE | 26/JULY/2020 |
| 5 | TITLE OF THE TOPIC | To study Clinical profile and outcome of blunt trauma chest |

# 6. BRIEF RESUME OF THE INTENDED WORK

## 6.1 NEED FOR THE STUDY

Blunt trauma to the chest is a very common occurrence in setting of traumatic incidents occurring with highest frequency in young adults between 15-35 years of age. Traumatic chest injuries lead to significant burden of mortality and morbidity in the young population. The most common modes of injury in such patients is motor vehicle accidents followed by other high energy traumatic scenarios like falls from height, contact sports, violence etc. This study was aimed at the evaluation and management of BTC with rib fractures and associated injuries. Injuries resulting from trauma of various sorts are one of the commonest causes of preventable or avoidable death across all ages and genders but it is the young adults between 15-35 years of age which form the bulk of the victims of traumatic death, being the most common cause of death in this age group.[1,2] Apart from mortality, trauma causes the highest amount of disability and number of healthy lives lost in this age group.[3] Blunt trauma to the chest forms a common mode of injury in these patients which not only poses a risk to the airway, breathing and circulation but also to life itself.[4] Twenty to 25% of deaths resulting from traumatic injuries occur because of chest injuries and the mortality from blunt chest trauma in US and Europe are reported to be as high as 60%.[4] The most common form of chest injury seen in over two-thirds of patients are rib fractures[5,6] forming 4-10% of admissions in trauma units.[5,7] A hugemajority (77%) of patients with rib fractures are managed without admission to the hospital[8] More than half of the rib fractures can be diagnosed on routine chest radiographs and only occasionally are special oblique films ordered[9] An indicator of severe trauma, rib fractures are associated with other visceral or skeletal injuries and in adult patients with BTC, the associated injuries have a stronger bearing on the overall mortality[10] Most studies done were on btc[11] The most common mechanism of injury in reported studies has been motor vehicle accidents (MVC),

followed by fall from height, road side accidents[11-14] contact sports, extreme sports, interpersonal violence.

This study was aimed at the evaluation and management of BTC with rib fractures and associated injuries. The thoracic cavity contains three major anatomical systems: the airway, lungs, and the cardiovascular system. As such, any blunt or penetrating trauma can cause significant disruption to each of these systems that can quickly prove to be life threatening unless rapidly identified and treated. Chest trauma accounts for approximately 25% of mortality in trauma patients. This rate is much higher in patients with polytraumatic injuries. 85-90% of chest trauma patients can be rapidly stabilized and resuscitated by a handful of critical procedures. Trauma patients are commonly encountered in all emergency departments, not just in specified trauma centers. For this reason, emergency medicine providers should be prepared to appropriately evaluate, resuscitate and stabilize any patient with chest trauma.

Unlike other disease entities, trauma patients often present with a known traumatic mechanism such as a car collision, fall, gunshot or stab wound. In rare cases, a patient may present in a state of significant altered mental status and be unable to provide any significant history. In these situations, certain physical examination clues to the presence of trauma include findings such as contusions, lacerations, or deformities. Palpation of crepitus over the chest wall may also be appreciated.

In patients who are awake and lucid, the chest trauma may present with chest pain, dyspnea, back or abdominal pain, and occasionally syncope. Unstable chest trauma patients may show signs of severe respiratory distress or profound shock requiring emergent resuscitation. Unstable chest trauma patients can also deteriorate to the point of traumatic arrest and depending on the mechanism of chest trauma, may be candidates for an emergent ED thoracotomy

## 6.2 REVIEW OF LITERATURE

In This Study 64 patients with BCT after excluding children below 18 years and elderly above 70 years of age Were Observed.

A strong male predilection was Noticed with 45 (70.3%) patients being Male

| MOI | (Male - | Female) |
|---|---|---|
| Traffic Accident | 30 | 11 |
| Pedestrian | 11 | 4 |
| Driver | 8 | X |
| Front Seat passenger | 2 | 3 |
| Bike driver | 7 | X |
| Pilon passenger | 1 | 3 |
| Rear Passenger | 1 | 1 |
| Fall from height | 6 | 5 |
| Fall of heavy weight | 3 | 1 |
| Hit by a domestic animal | 2 | 2 |
| Assault | 2 | X |
| Sports | 2 | X |

ASSOCIATED THORACIC INJURIES

| INJURY | NO OF PATIENTS- | Percentage |
|---|---|---|
| Lung contusion | 24 | 37.5% |
| Pneumothorax | 18 | 28.13% |
| Hemothorax/Hemopneumothorax | 15 | 23.44% |
| Flail chest | 8 | |
| 12.5%[18] ,19,20] | | |
| Multiple rib fractures(>2) | 58 | 90.6% |

ASSOCIATED Abdominal Injury

Splenic Injury

Grade 1-3 (Conservative)

Grade 4,5 (Splenectomy)

Liver Injury

Grade 1-3 (Conservative)
Grade 4,5
Retroperitoneal hematoma 3 4.69%
Renal parenchymal injury 1 1.6%
Mesenteric tear 1 1.6%
Gut perforation 1 1.6%

ASSOCIATED MUSCULOSKELETAL INJURIES
Fracture Clavicle (Ipsilateral)
Head injury 11 17.2%
Fracture Proximal Humerus 12 18.75%
Vertebral Fractures 8 12.5%
Fracture Pelvis 7 10.9%
Elbow fractures
Fracture Lower limb
Femur
Tibia-fibula
Ankle
Calcaneum

and 19 (29.7%) females.

Most patients (58) that were admitted in the A&E had more than two rib fractures. Only six patients had a single rib fracture but needed admission because of other accompanying injuries.

Most common associated chest injury was lung contusion in 24 patients, followed by pneumothorax, hemo/hemopneumothorax and flail chest. In many patients these injuries occurred concomitantly with strongest association being between lung contusion and pneumothorax.

Most rib fractures and lung contusions were managed with conservative treatment in accordance with the ATLS protocol, including supplemental O2 inhalation, IV fluid replacement, adequate analgesia, antibiotics if needed and close observation. Three patients who were intubated for low GCS because of associated head injury were

mechanically ventilated. The management of pneumothorax and hemo/pneumothorax depended upon the extent of injuries. In 18 patients with simple pneumothorax, three were managed conservatively while the rest (15) were managed with ICTD inserted via the 5th ICS in triangle of safety. Four patients with massive hemothorax required subsequent thoracotomy at a higher centre, while the rest were managed with ICTD

Flail chest was associated with pneumothorax in four patients which was managed with ICTD and close observation, four patients with flail chest had associated hemothorax only two of which underwent a thoracotomy, while the other two were managed with ICTD and observation.

In multiple patients with high energy trauma injuries to the abdominal viscera were also observed. The most common was splenic injury, expectedly associated with lower rib fractures of left side, closely followed by liver injury with lower rib fractures of right side. Other visceral injuries like renal injury, mesenteric injury, gut injury were uncommonly seen.

Most solid organ injuries were amenable to conservative management. Four patients required laparotomy, three required splenectomy for grade 4,5 splenic trauma, one of them also had a mesenteric tear which was repaired concomitantly and one required laparotomy for gut perforation requiring repair.

Apart from thoracic and abdominal injuries, skeletal injuries and head injuries were also encountered in association with BTC. Most common associated injury was fracture clavicle, followed by head injury, vertebral fractures, pelvic fracture, and extremity fractures. Among fractures of the extremity, upper limb fractures were more common than lower limb fractures e.g fractures of proximal humerus and fractures around elbow. Most spinal injuries were located in the thoracic and thoraco-lumbar region (between T8-L2); both stable and unstable injuries were observed. Three patients with spinal column injuries had neurodeficit while the rest had intact neural functions. Four patients with spinal fractures were operated with fixation with posterior

instrumentation, while others were managed conservatively. Extremity fractures were managed as per the orthopedic protocol. Majority of clavicle fractures were managed conservatively, while four of them required operative fixation. Many patients sustained multiple skeletal injuries. Close association between lower rib fracture and splenic injury was noticed[15-17] in flail chest mortality rates between 11 and 40 % have been reported[18,19,20], we witness the death of two out of eight (25%) patients with flail chest.Chest trauma has quickly risen the second most common traumatic injury in non-intentional trauma. Trauma to the chest comes with the highest mortality; in some studies, up to 60%.[21] Quick thinking and early interventions are key factors for evaluations, management, and survival..Chest trauma can be a result of penetrating or blunt trauma. Blunt trauma, on the whole, is a more common cause of traumatic injuries and can be equally life-threatening. It is important to know the mechanism as management may be different.[22,23] Most blunt trauma is managed non operatively, whereas penetrating chest trauma often requires operative intervention. All age ranges are at risk for chest trauma. After head and extremity trauma, chest trauma is the third most common blunt injury and quickly rising to second. Motor vehicle injuries are the most common of these. However, this is declining with the advent of improved vehicle safety.[23-25] Early recognition of trauma to the chest is a priority. The first 3 steps of trauma evaluation involve evaluation, recognition, and intervention of potential injuries to “the box.” Following a routine method of evaluation reduces missed injuries. Injuries to the heart and lungs are primary and vital since they have the highest mortality if missed. Injuries to other thoracic structures also need to be considered; ribs, clavicle, trachea, bronchi, esophagus, and arteries including the aorta and veins need to be evaluated in the secondary and tertiary survey. The primary survey serves as a time to identify immediately life-threatening injuries. These injuries should be addressed at the time of identification. Potential injuries that should be ruled out are:

- Large hemothorax
- Large pneumothorax
- Pericardial effusion with or without tamponade

Once the initial exam is complete and adjunct imaging is complete, a secondary survey may reveal:

- Rib fractures
- Small hemothorax
- Small pneumothorax
- Pulmonary contusion
- Chest wall contusion

There are physical exam findings that increase suspicion of chest trauma. Contusions of the chest wall in the pattern of seatbelts, point tenderness over the ribs, decreased breath sounds over the hemothorax, tachypnea, hypoxia, alone or conjunction with other findings suggest thoracic trauma. The mechanism should also be considered. If mechanism warrants a high level of suspicion, an ECG should be done to evaluate cardiac contusion. While chest radiography prevails, it does have limitations. Since chest radiography is achieved in the supine position, small and medium-sized pneumothoraces and hemothoraces may be missed.

## 6.3 AIMS AND OBJECTIVES OF THE STUDY

To study clinical profile and outcome of blunt trauma chest.

## 7. MATERIALS AND METHODS

### 7.1 Source of Data

This study will be conducted in DMC & H Ludhiana. The study will include patients presenting from 1st March 2021 to 31st August 2022 with blunt trauma chest and hospital course of such patients will be traced.

### 7.2 METHOD OF COLLECTION OF DATA

Patients of age between 18 and 70 years will be included in the study. The data regarding age, gender, mode of injury, presence of thoracic injuries, abdominal injuries, skeletal injuries would be gathered and tabulated.

**INCLUSION CRITERIA**-

All the patients of polytrauma requiring admission.

**EXCLUSION CRITERIA**-

1-Patients below 18 years and above 70 years of age of either gender.

2-Severly traumatized patients who expire before they could be evaluated for chest trauma

3-Penetrating thoracic injuries

**DURATION OF STUDY** – 1st March 2021 to 31st August 2022

**OUTCOME**

Early investigations, resuscitation and management of the BTC patients can lower the mortality rate upto as much as 80%.

**STATISTICAL ANALYSIS**

Data will be described in the terms of range, mean +/- standard deviation, frequencies (number of cases), and relative frequencies (percentages) as appropriate. Comparison of quantitative variables will be done using paired t-test. A probability value of less than 0.05 will be considered statistically significant. All statistical calculations will be done using SPSS ver.21.

**7.3 DOES THE STUDY REQUIRE ANY INVESTIGATIONS OR INTERVENTIONS TO BE CONDUCTED ON PATIENTS OR OTHER HUMANS OR ANIMALS? IF SO, PLEASE DESCRIBE BRIEFLY.**

CHEST X RAY, CT CHEST, LAB TESTING, ICD/PIGTAIL INSERTION, THORACOTOMY

**7.4 HAS ETHICAL CLEARANCE BEEN OBTAINED FROM YOUR INSTITUTION IN CASE OF 7.3?**

Attached here with

## LIST OF REFERENCES


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# PROFORMA

SERIAL NO:

NAME: AGE/SEX:

MRD.NO: Adm. NO:

DOA: DOD :

ADDRESS:

MECHANISM OF INJURY

TIME /DATE OF INJURY

PRESENT HISTORY LOC /HEADACHE/SEIZURE

CHEST PAIN/ BREATHLESSNESS/ HEMOPTYSIS



**Signature of Candidate** **Signature of Supervisor**

ABD PAIN /DISTENSION

INABILITY TO MOVE ANY LIMB

FIRST AID YES/NO

GENERAL EXAMINATION:-

GCS

PR

BP

RR

SPO2

PALLOR

CYANOSIS

TRACHEAL SHIFT

CHEST EXAMINATION



**Signature of Candidate** **Signature of Supervisor**

CVS/CNS/PA EXAMINATION

TYPE OF INJURY

1-BONY CAGE INJURIES

| | |
|---|---|
| A. SIMPLE RIB FRACTURE | YES/NO |
| B. MULTIPLE RIB FRACTURES | YES/NO |
| C. FLAIL CHEST | YES/NO |
| D. FRACTURE CLAVICLE | YES/NO |
| E. FRACTURE STERNUM | YES/NO |
| F. PNEUMOTHORAX | YES/NO |

2-PLEURAL SPACE INJURIES

| | |
|---|---|
| A.HEMOTHORAX | YES/NO |
| B.PNEUMOTHORAX | YES/NO |
| 1-TENSION PNEUMOTHORAX | YES/NO |
| 2-SUCKING CHEST WOUNDS | YES/NO |
| C.HEMOPNEUMOTHORAX | YES/NO |

3-INJURY TO THE LUNGS

| | |
|---|---|
| 1-PULMONARY CONTUSIONS | YES/NO |
| 2-LUNG LACERATION | YES/NO |
| 4-TRACHEO BRONCHIAL INJURIES | YES/NO |

5-ESOPHAGEAL INJURY YES/NO

6-INJURY TO DIAPHRAGM



**Signature of Candidate** **Signature of Supervisor**

PRESENTATION

ASSOCIATED INJURIES

1-HEAD YES/NO

2-FACE YES/NO

3-NECK YES/NO

4-ABDOMEN YES/NO

5-EXTREMITIES YES/NO

ROUTINE INVESTIGATIONS:

CXR

ECG

SPO2

OTHERS-USG CHEST

ECHOCARDIOGRAPHY

CT SCAN (HEAD/CHEST/ABDOMEN AND PELVIS)

MANAGEMENT:

1. O2 YES/NO

2. AMBUBAG VENTILATION YES/NO

3. TRACHEOSTOMY YES/NO

4. THORACOTOMY YES/NO

Indications of Thoracotomy

| | |
|---|---|
| Immediate Output | > 1.5 L in first Hour |
| Ongoing Output | > 200 cc/hr over next 2-4 hours |



**Signature of Candidate** **Signature of Supervisor**

INDICATION:

4-INTERCOSTAL TUBE DRAINAGE YES/NO

INDICATION

DAYS

5. I.V. FLUIDS

DAYS

6. BLOOD TRANSFUSION

BLOOD GROUP

7. SEDATION YES/NO

ANALGESICS YES/NO

MUSCLE RELAXANTS YES/NO

8-INTERCOSTAL NERVE BLOCKAGE YES/NO

REVISED TRAUMA SCORE

| PARAMETER | FINDINGS | POINTS |
|---|---|---|
| RESPIRATORY RATE | 10-29/ MINUTE | 4 |
| | >29/ MINUTE | 3 |
| | 6-9 / MINUTE | 2 |
| | 1-5 / MINUTE | 1 |
| | 0 | 0 |
| SYSTOLIC BLOOD PRESSURE | >89mm Hg | 4 |
| | 76-89mmHg | 3 |
| | 50-75mmHg | 2 |
| | 1-49mmHg | 1 |
| | 0 | 0 |
| Glasgow Coma Score | 13-15 | 4 |
| | 9-12 | 3 |
| | 6-8 | 2 |



**Signature of Candidate** **Signature of Supervisor**

| | | |
|---|---|---|
| | 4-5 | 1 |
| | 3 | 0 |

Revised trauma score-

= (points for respiratory rate) + (points for systolic blood pressure) + (points for Glasgow Coma Score)

Interpretation:

MAX SCORE -12

MIN SCORE -0

POTENTIALLY IMPORTANT TRAUMA OCCURS WITH SCORES <=11; THESE PATIENTS SHOULD BE TREATED AT A TRAUMA CENTRE



**Signature of Candidate** **Signature of Supervisor**

## INFORMED PATIENT CONSENT

Date: _____

I.....D/o, W/o, S/o..... am willing to participate in the study **"TO STUDY CLINICAL PROFILE AND OUTCOME OF BLUNT TRAUMA CHEST"** The procedure with its complications has been explained to me in local vernacular language. I have fully understood that no special tests and extra expenditure in any form, merely for the purpose of thesis is being carried out. I am free to opt out the study any time without assigning any reason.

..... .....

Signature of the Witness Signature of the patient

Name:

**Signature of Candidate** **Signature of Supervisor**

# मरीज अनुमति फार्म

तिथि _____

मैं _____ पत्नी/पुत्र/पुत्री _____

निवासी _____

इस शोधकार्य **"TO STUDY CLINICAL PROFILE AND OUTCOME OF BLUNT TRAUMA CHEST"** में भाग लेने के लिए सहमत हूँ। मैं इस शोधकार्य में भाग लेने के लिए अपनी स्वेच्छा से तैयार हूँ। मैं पुष्टि करता/करती हूँ की यह स्वीकृति देने के लिए मुझे कोई आर्थिक प्रलोभन नहीं दिया गया और न ही दबाव डाला गया है। मुझे इस शोधकार्य का उद्देश्य स्पष्ट कर दिया गया है और मुझे यह विश्वास है की यह विज्ञान और मानवता के लाभ के लिए है। मुझे इस शोधकार्य में होने वाले जोखिम के बारे में समझा दिया गया है और मेरी समझ में यह जोखिम बहुत मामुली है।

मैं इस शोधकार्य में भाग लेने के सम्बन्ध में किसी भी समय अपनी अस्वीकृति व्यक्त कर सकता/सकती हूँ और मेरे अस्वीकृति व्यक्त करने का मेरे इलाज पर कोई प्रभाव नहीं पड़ेगा।

_____ _____

गवाह के हस्ताक्षर रोगी के हस्ताक्षर/अंगूठे का निशान

नाम: नाम:

_____

अन्वेषक के हस्ताक्षर

_____

विद्यार्थी के हस्ताक्षर

# ਮਰੀਜ਼ ਰਜ਼ਾਮੰਦੀ ਫਾਰਮ

ਮਿਤੀ_____

ਮੈ_____ਪਤਨੀ/ਪੁੱਤਰ/ਪੁੱਤਰੀ_____

ਵਾਸੀ _____

**"TO STUDY CLINICAL PROFILE AND OUTCOME OF BLUNT TRAUMA CHEST"** ਤੇ ਚਲ ਰਹੀ ਖੋਜ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਰਜ਼ਾਮੰਦ ਹਾਂ। ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਮੈ ਆਪਣੀ ਮਰਜ਼ੀ ਨਾਲ ਤਿਆਰ ਹਾਂ। ਮੈ ਇਹ ਦਸਣਾ ਚਾਹੁੰਦਾ ਹਾਂ/ ਚਾਹੁੰਦੀ ਹਾਂ ਕੇ ਇਹ ਰਜ਼ਾਮੰਦੀ ਦੇਣ ਵਾਸਤੇ ਮੈਨੂ ਕਿਸੇ ਵੀ ਤਰਾਂ ਦਾ ਲੋਭ-ਲਾਲਚ ਨਹੀ ਦਿੱਤਾ ਗਿਆ ਅਤੇ ਨਾ ਹੀ ਕੋਈ ਦਬਾ ਪਾਇਆ ਗਿਆ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਦਾ ਮਨੋਰਥ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਭਰੋਸਾ ਦਵਾਇਆ ਗਿਆ ਹੈ ਕੇ ਇਹ ਖੋਜ ਵਿਗਿਆਨ ਅਤੇ ਮਾਨਵਤਾ ਦੀ ਭਲਾਈ ਲਈ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਵਿਚ ਹੋਣ ਵਾਲੇ ਖਤਰੇ ਬਾਰੇ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਯਕੀਨ ਹੈ ਕੇ ਇਹ ਖਤਰਾ ਬਹੁਤ ਮਾਮੂਲੀ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਦਾ ਢੰਗ – ਤਰੀਕਾ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ।

ਮੈ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਬਾਰੇ ਆਪਣੀ ਰਜ਼ਾਮੰਦੀ ਕਿਸੇ ਵੀ ਸਮੇ ਵਾਪਸ ਲੈ ਸਕਦਾ ਹਾਂ/ ਸਕਦੀ ਹਾਂ ਅਤੇ ਮੇਰੀ ਰਜ਼ਾਮੰਦੀ ਵਾਪਸ ਲੈਣ ਦਾ ਮੇਰੇ ਇਲਾਜ ਤੇ ਕੋਈ ਅਸਰ ਨਹੀ ਹੋਵੇਗਾ।

_____ _____

ਗਵਾਹ ਦੇ ਹਸਤਾਖਰ ਮਰੀਜ਼ ਦੇ ਹਸਤਾਖਰ

ਮਿਤੀ_____ ਮਿਤੀ_____

ਪਤਾ _____ ਪਤਾ _____

_____

ਨਿਰੀਖਕ ਦੇ ਹਸਤਾਖਰ

_____

ਸਿਖਿਆਰਥੀ ਦੇ ਹਸਤਾਖਰ